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A

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FOR 1883

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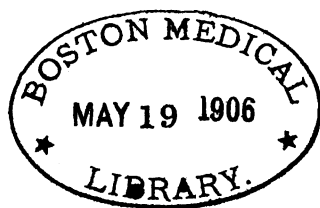
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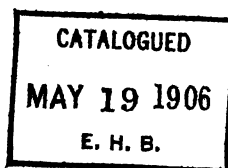
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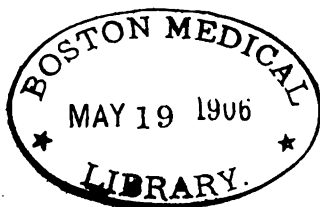
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A GENERAL REVIEW OF THE YEAR'S ADVANCE IN THERAPEUTICS.

BY R. W. AMIDON, A.M., M.D.

THE advances of therapeutics during the past year seem, after a cursory review of the field, to lack the stability one would wish for what each year is becoming more nearly an exact science. Apparently there has been little of genuine value added to our knowledge by workers in the field of experimental therapeutics. Scores of new drugs have been forced on our attention; but the presentations have been made, not by the pains-taking experimenter, but by our *too* enterprising wholesale druggists, whose multifarious pharmaceutical preparations and shotgun formulæ are gradually pushing extempore prescribing and the doctor's individuality to the wall.

How long will it be before our medical journals present the same disgraceful appearance as the following list of preparations advertised on *one page* of the *Gazette des Hôpitaux*?¹ (and I may say the French journals are about all alike in this respect, and portray a state of affairs deplorable indeed.) Defresne's peptone and peptonic wine, Pouillet's sulphur preparation, Bain's elixir and wine of coca, Gérardel's pastilles, Gras' syrup of gelatinous phosphate of lime, Godin's cod-liver oil with benzoate of iron, Rigollot's papers, Labélonye's syrup of digitalis, Reynaud's flannel and herbal pad, Mure's syrup of potassium bromide, Hertzog's Swiss pills, Collas' syrup of bromide of potassium and lithium, and

¹ Dec. 6, 1883, p. 1120.

pills of bromide of lithium, Limousin's wafers of sulphate of quinine, etc.; the proper names being those of pharmacists making and vending their wares. How long before *our* doctors' independence sinks to such a low ebb as to tolerate such inexcusable quackery?

The greatest activity among therapeutical experimenters and clinicians during the past year has been in the channels created, we may say, by experimental biologists and pathologists; foremost among whom come Pasteur, and later, with less real worth and even more popular clamor, Koch.

Of the utility and high scientific merit of Pasteur's many discoveries, I need say nothing, as they have made his name familiar to all. The etiological or pathological importance of Koch's findings, many do not yet concede; yet upon their correctness depends the success of the various anti-parasitic treatments of phthisis. These theories, however, have instigated a careful study of the germicide power of various disinfectants. Sternberg finds that the micrococcus of pus dies in a .005 per cent solution of corrosive sublimate; and, experimenting with other agents of real or supposed antiseptic powers, he finds that the mercuric chloride has the most power, that of carbolic acid being two hundred times less. The proportions of eleven other agents he also gives.

Leonardi asserts that ozone is the most active sterilizing agent, oxygenated water next, and corrosive sublimate next.

Starting out of these and similar investigations, there have grown new methods of treating various diseases of supposed parasitic nature, and new surgical dressings.

Most noteworthy have been the experimental treatments of phthisis. Hiller, trying nine remedies, found that corrosive sublimate hypodermically gave better, or, rather, less bad, results than the others: injected into the pulmonary parenchyma, it set up much irritation, and once, by the cough it caused, a severe hemorrhage. Albrecht thinks methodical inhalations of oxygen stay the disease. Ananiin gave hypodermically .01 of corrosive sublimate daily to phthisical patients, with no benefit; while, on the other hand, under inhalations of sulphurous acid, symptoms seem to ameliorate.

Buchner believes it impossible to act directly on the bacilli, and favors only a treatment which will fortify the system against the disease. He thinks treatment by arsenic holds out the most hope.

Pick recommends the powdered metal aluminium; thinks it is toxic to bacilli. Kazansky advises impregnating the air with the vapor of turpentine and benzine (a procedure which probably liberates ozone. — ED.).

As a result of all this experimentation, one may conclude, that perhaps the internal administration of arsenic, with tonics, stimulants, and good food, holds out the greatest inducements.

Decided changes have been made in antiseptic surgery. A position pre-eminent, perhaps deservedly so, has been accorded to iodoform as an antiseptic surgical dressing.

To aid in the study of what promises to be an addition to surgery of permanence and value, there is introduced into this volume an historical, chemical, and physiological article on iodoform, by Rummo, kindly translated by my friend Dr. George B. Phelps, interne at the New-York Hospital. As an antiseptic surgical dressing, very many eminent authorities give it the preference over all others; and, in fact, almost all the objections that can be urged against its use are its odor, its insolubility in water, and its rather rare toxic action. That it is more apt to give rise to poisoning than carbolic acid, is, I think, not proven.

As an outcome of biological research, corrosive sublimate has been widely used in antiseptic surgery. It has been found that solutions of this agent, far too weak to cause toxic symptoms in man, even when freely used, have an invariably deadly effect on low organisms, as bacteria, and, when used, prevent their development. Weir claims for it many advantages over the original Lister dressing.

As an irrigating fluid, it has a great many advantages; and when freely used as such, and subsequently as a dressing, it rarely causes stomatitis or enteritis. It is apt, however, to irritate the edges of wounds and the unbroken skin with which it comes in contact. Negri thinks it superior to carbolic acid in puerperal antisepsis.

The solution of corrosive for irrigating purposes is rarely stronger than 1-1000, very often weaker.

Helenol (an active ingredient of alder-root) is held by De Korab and Blocq to equal carbolic acid in antiseptic power, and to want its bad odor and toxic qualities.

Boric acid and resorcin have their adherents as valuable antiseptics, while bismuth by many is considered a very superior surgical dressing.

Naphthalin as an antiseptic surgical dressing is highly recommended, but has the disadvantages of smelling, being insoluble in water, and producing some irritation in the wound. In erysipelas and eczema, it has yielded good results.

Pott has found that the best agent to preserve vaccine lymph, and still not impair its efficacy, is borate of soda.

Dermatologists find in gelatine, plain or medicated, a very valuable protective or combined protective and vehicle.

Besides its antiseptic power, which is about equal to that of carbolic and salicylic acid, resorcin has undoubtedly some power over fever, and particularly malarial fevers; and it also reduces splenic and hepatic enlargements in malarial subjects. In other pyrexias it lowers the temperature, but has no other effect on the disease.

Hofmann and others say that chinolin is a germicide in a .2 per cent solution; being more powerful than salicylic, carbolic, and boric acids, and alcohol. Its cost is one-fifth that of quinine; and it is pleasanter to take, as it causes no tinnitus aurium or vertigo. Its antipyretic power is about the same.

Carbamide also is recommended in the treatment of intermittent fever.

Typhoid fever has been almost epidemic in Paris during the last year: still, little that is new in its treatment has been discovered, although months were devoted to its discussion in the various Paris societies.

Dumont-Pallier and others have gone all over the cold-bath treatment, the utility and safety of which was pretty definitely settled years ago.

Sorel recommends the simultaneous administration of sulphate of quinine and salicylate of soda. Ergot is recom-

mended by Duboué, Lardier, and others; iodide of potassium, by still others; while two or three have employed salicylate of bismuth with good results.

A new antipyretic, kairine, has been brought to the notice of the profession. Filehne has studied it carefully, both chemically and therapeutically. He says the crude drug is composed of ethylic and methylic kairine and kairoline. As a result of considerable experimentation, it may be safe to say that kairine m. will reduce the temperature when elevated from almost any cause. This reduction is sudden, and apt to be accompanied by a profuse sweat. It is not, however, a permanent reduction of temperature which takes place; and, in most febrile diseases in which it has been tried, the morbid process goes on. It slows the pulse and respiration, and lowers the arterial tension. Some of it passes out of the body unchanged in the urine, which is of a dark yellow or green tint for hours.

Schilling highly recommends an aqueous extract of ergot to mollify the tinnitus and deafness resulting from the use of cinchona and salicylic products.

Convallaria Maialis has been pretty thoroughly tried and discussed during the past year; and the gist of evidence seems to be, that, after all, its utility is overbalanced by its disadvantages and dangers.

So high an authority as Althaus has entered a very strong plea against the indiscriminate use of massage. Besides its uselessness in many diseases in which it is employed, he points out that in many of them it is a positive harm.

His protest comes none too soon; for massage is to therapeutics what malaria is to diagnosis, — a cloak to hide one's ignorance, or a troublesome, costly, and unscientific placebo.

Let the practitioner know that its uses are just as limited as those of strychnine, and that it should be prescribed with equal care. •

Two hypnotics have been brought forward. Morselli, Langreuter, and others assert that paraldehyde in from 2. to 6. doses produces pretty sudden sleep, which is tranquil and reparative, and not followed by bad symptoms. The pulse becomes slower and fuller, and there is a slight fall of temperature.

The other hypnotic is acetal, which, according to Von Mering, may be a diethyl or dimethyl acetal. Von Mering concludes that it acts first on the cerebral hemispheres, then on the cord, and lastly on the medulla oblongata. It causes death in animals by stoppage of respiration, the heart continuing to beat for some time.

Von Mering asserts that 10. to 12. will cause profound sleep for several hours, and when not inducing sleep will deaden or kill pain. Others, as Berger and Leyden, discredit its usefulness; and Leyden says it has a caustic effect on the mucous membranes.

Rather heroic attempts at the surgical treatment of pulmonary lesions have become rather fashionable; but so far, where the pulmonary parenchyma has been invaded, the results have not been very flattering.

Bergeon advocates a new way of administering drugs by means of tracheal injections, which he claims are innocuous and efficacious.

Transfusion, of various sorts and for different pathological conditions, has acquired new life. The intravenous injection of different saline solutions, artificial serums, nutrient fluids, etc., has been widely practised for anæmia acute and chronic, for collapse, etc. The results have been rarely flattering.

Paladini injected blood hypodermically in a case of puerperal hemorrhage, with relief, and recovery of the case.

Peritoneal transfusion has been the subject of much experimentation, and it has many advocates; but the published results seem the reverse of satisfactory.

Refusion, as practised by Halsted, seems to be an excellent remedy for gas-poisoning or cases of profound asphyxia. He withdraws blood from the patient, oxygenates it, and re-injects it.

THERAPEUTICS.

ACETAL.

Sleep and Anaesthesia from the Acetals. Von Mering.
— *Ueber die hypnotisirende und anaesthesirende Wirkung der Acetale.* (*Berlin. klin. Woch.*, Oct. 23, 1882; *Rev. des Sciences Méd.*, April 15, 1883.)

Acetals are volatile liquids, with an ethereal odor, slightly soluble in water, which are produced by heating a mixture of alcohol and aldehyde with sulphuric or acetic acid and pumice-stone. Diethylacetal or acetal and dimethylacetal result.

Acetal, with a formula of $C_4H_{10}O_2$, boils at $40^\circ C.$, dissolves in eight volumes of water, and mixes in all proportions with alcohol. Its specific gravity is .85; it has an odor of its own; its taste is slightly bitter and burning, and leaves the taste of peppermint in the mouth.

An injection of .05 under the skin of a frog causes a motor paralysis and profound torpor, soon followed by a general anæsthesia with abolition of excito-motor power. There is no disturbance of cardiac rhythm, but the pulse is slightly accelerated.

In rabbits, 2.-4. produces profound narcosis and general anæsthesia; sensibility returns after some hours. Smaller doses produce a somnolence with diminished excitability. The pulse remains strong and regular.

In dogs, 10. induces profound sleep, with entire abolition of reflex power, pulse, and respiration. There is a marked contraction of the pupils, which is overcome by atropine.

The arterial pressure falls from the start, and the fall is proportionate to the dose.

When reflex irritability ceases, respiration is slowed, and becomes superficial, and finally ceases.

Von Mering concludes that the drug acts first on the cerebral hemispheres, then on the cord, and lastly on the medulla.

Of eight human subjects, to whom were given 10.-12., six slept profoundly, in broad daylight, for several hours; the others, both having violent pains, took 8., and, without sleeping, remained in a sort of drunken state all day, almost entirely free from pain.

In no case did the acetal leave any vomiting, headache, or malaise.

Dimethylacetal has similar physiological effects, but the dose is only half that of diethylacetal.

Its formula is $C_4H_{10}O_2$; it boils at 18° C. Von Mering administered this by inhalation, and found it produced profound sleep, without seriously embarrassing either pulse or respiration.

Berger (*Breslauer ärztl. Zeitschr.*, 1883, No. 6; *Gaz. Méd. de Paris*, July 14, 1883) asserts the narcotic power of the drug is very slight and transient. In some patients, the medicine causes vomiting, redness of the face, heaviness of the head, and a sort of drunkenness which lasts some hours. He once gave 18., with the effect only of making the patient sleep an hour.

Langreuter (*Deutsche Medicinal-Zeitung*, Aug. 23, 1883; *N.Y. Med. Jour.*, Sept. 22, 1883) has found that the medium dose is 8.-10. With it, nervous patients become quieter, if they do not fall asleep. In seventy-five per cent of the cases in which he tried it, it succeeded. He, however, does not recommend it.

Stoltenhoff's conclusions (*Centralbl. für Neuenheilkunde*, 1883, No. 6; *Gaz. Méd.*, July 14, 1883) are favorable to those reached by Mering. In the case of an old woman with a dementia of five months' standing, accompanied with excitement and persistent insomnia, opium had given no relief; after a 5. dose of acetal (diethylacetal), she slept all

night, and was calm all the next day. This beneficial effect persisted; and the woman took, in all, 320. of acetal.

The same results followed the use of the drug in the treatment of the period of excitement of general paralysis, and in cases of acute mania.

The sedative and hypnotic effects come on in from five to thirty minutes, and last from four to ten hours.

In the clinic of Professor Leyden, the drug has proved very unsatisfactory. (*Deut. med. Woch.*, 1883, No. 9; *Gaz. Méd. de Paris*, July 14, 1883.) Narcotic effects could only be obtained after doses of 8.-10. It seemed to have a caustic effect on the mucous membranes; and, on waking, the patients often complained of heaviness of the head, malaise, weight in the limbs, nausea and vomiting. Leyden thinks it less active than chloral, and not so convenient.

Aconite and Aconitine.—Laborde and Duquesnel have made an exhaustive study of the physiological effects of aconite. According to Laborde, aconitine acts chiefly on the medulla and cord. The excitability of motor nerves is not at all affected by moderate doses; a larger dose increases the amplitude of muscular contractions, which, however, show some irregularities and intermissions. A toxic dose rapidly destroys motricity; the excitability of the muscle disappearing at the same time as that of the nerve, as takes place with curare.

Motor incoördination is one of the first and essential manifestations of aconite poisoning.

Upon the heart of a frog, Laborde describes:—

1st, a period (short) of acceleration, with smaller and irregular contractions of the heart;

2d, Period of doubled force and amplitude of contractions;

3d, A slow and progressive weakening, with lengthening periods of intermission, and final arrest, — ventricles first, auricles last. Electrical excitation at the moment of death produces a vigorous contraction, hence the drug does not destroy the contractility of the cardiac fibre.

To produce the above effects, the nitrate of aconitine must be given in doses of from .0001 to .0004, according to the

size of the frog. Aconitine acts on the heart, first through the medullary-spinal nerves, and later through the pneumogastric nerves.

There is a passing elevation of arterial tension, and a later, less rapid fall.

Respiration is irregular throughout ; and it is from apnoea, not syncope, that death ensues. Vomiting and diarrhoea often occur. The pupil first oscillates, with a tendency to myosis. The local effect on the eye is the same. Later an extreme mydriasis occurs, which Laborde thinks is reflex from gastro-intestinal irritation, and from asphyxia. Aconitine acts on organs of excretion in different degrees, — the liver first, then the salivary glands, the kidneys, and the gastro-intestinal. It is eliminated unchanged by the kidneys. (*Rev. de Médecine*, Sept. 10, 1883.)

Aconite for Dysmetrorrhagia. — For the metrorrhagia following lumbo-abdominal neuralgia, Chéron¹ recommends one drop of tincture of aconite every fifteen minutes for six hours, with no reference to meals. The second day, if the uterine hemorrhage is notably lessened, continue in the same way. If there is no diminution, double the dose.

The maximum daily dose rarely exceeds forty-five or fifty drops. (*Du mode d'emploi de la teinture d'aconit dans le traitement des métrorrhagies névralgiques.*)

Aconitine Poisoning. — Dujardin-Beaumetz narrated, at the Therapeutical Society, a case where a doctor prescribed in such a way that the patient took at one dose .04 of the nitrate of aconitine. There was burning in the mouth and throat, and almost immediate vomiting. The dose was repeated three times, and vomited each time. In the evening he took a like amount, which he retained ; but all night he suffered from oppression, an icy coldness, and an internal burning. The doctor, to prove the harmlessness of the drug, took of the solution fifty to sixty drops, representing .08 to .12 of the aconitine. The toxic effects commenced in a quarter of an hour. Four hours later he was found pale, with a small, irregular, but not rapid pulse, cool skin, con-

¹ *Rev. de Thérap.*, Jan. 15, 1883.

tracted pupils; he had a burning in the mouth, and a sense of constriction from the throat to the abdomen; he had pre-cordial distress, heaviness and weakness of the limbs, especially the legs. The pupils would suddenly dilate, and blindness ensue; but sight would be restored when the pupils contracted anew. Spontaneous vomiting was aggravated by tickling the fauces.

Soon there appeared an active congestion of the head, and simultaneously the first convulsions and stertorous respiration. He complained of deafness, and a tinnitus situated in one and the other ear alternately.

After a subcutaneous injection of ether, the pupils dilated anew, vision was abolished, vomiting and violent and prolonged convulsions set in.

A second injection of ether was made, but the patient did not recover consciousness. The pupils, enlarged, no longer re-acted to light; the respiration was slow and labored; in spite of electricity, it became more and more difficult; the heart gradually failed, and death occurred five hours after the ingestion of the poison.

The autopsy revealed great pallor of the skin and muscles, while the internal organs were markedly congested. The intestines were especially hyperæmic, except the colon and rectum, which were anæmic, as was the bladder. The lungs were adherent to the chest-walls, and very congested. They contained fresh and old tubercles, and a small cavity. The heart was in diastole; its right cavities contained a little liquid blood. The meningeal vessels were distended, and at certain points there was some exudation in the arachnoid. In the ventricles there was bloody serum, and upon the choroid plexus a bloody exudation. The blood was everywhere liquid, and of a clear cherry-red color. (*Soc. de Thérap.*, Jan. 10, 1883; *Bull. et Mém. de la Soc. de Thérap.*, Feb. 15, 1883.)

Adonis Vernalis. — Bubnow, in a graduation thesis (*Deut. Archiv. für klin. Med.*, p. 262, vol. xxxiii.), details experiments made in the wards of Botkin with this drug in cases of dropsy and heart-disease. In all animals, the drug stimu-

lates the inhibitory apparatus, and motor nerves of the heart, and increases the contractility of the cardiac muscle. It also causes contraction of small arteries throughout the body. In cases of dropsy, the cardiac contractions are increased in force, become less frequent, more regular, and fuller; the urinary secretion increasing from 200 cc. to 2,000 cc. or 3,000 cc., and albumen and casts disappearing. (*Lancet*, Jan. 6, 1883.)

Compressed Air. — Dupont employs air under a pressure of three atmospheres in the form of a douche. He directs the stream of air against the nude body, and accomplishes the following results: —

1. A flagellation, a deep depression of the integuments, a displacement, a sliding of the superficial over the deeper tissues, a true massage which drives the blood from the periphery.

2. Refrigeration of the skin, and rapid re-action.

No friction being necessary to warm the patient, and not being wet, the patient can dress immediately.

The refrigeration can be as profound as wished, as the rapid evaporation produced by the stream of air can lower the temperature to the extent of producing local anæsthesia.

After the douche, the patient has a buoyant feeling, and a marked sensation of warmth in the skin.

He considers it indicated, —

1. In pulmonary tuberculosis, chlorosis, anæmia, obesity, rachitism, etc., to excite the nutritive processes;

2. In œdema, hyarthrosis, and anchylosis, to stimulate the circulation, and the absorption of exuded liquids;

3. In contracture, hyperæsthesia, and hysteria, because of its anæsthetic properties, which can be enhanced by an admixture with carbonic-acid gas;

4. As a useful adjuvant to electricity in different cases of paralysis. (*Bull. Gén. de Thérap.*, Sept. 30, 1883.)

The Influence of Alcohol on the Physiological Effect of Chloroform. — Dubois has found, that, in acute alcoholism, anæsthesia is produced more rapidly; that the vital resistance of the animal is shorter; that the proportion of

chloroform in the anæsthetic mixture should be lowered; that the volume of the mixture necessary to produce anæsthesia and death is less; that, as in animals not alcoholized, the temperature falls in direct proportion to the resistance of the subject. Subjects addicted to alcohol, whose supply has been suddenly cut off, are, on the other hand, very rebellious to anæsthetics. (*Gaz. des Hopitaux*, Nov. 15, 1883.)

The Direct Action of Ethyl (Common) Alcohol upon the Heart. — Dr. H. Newell Martin of Baltimore, professor of biology in the Johns Hopkins University, in a paper read before the Medical and Chirurgical Faculty of Maryland (*Maryland Med. Jour.*, Sept. 8, 1883), detailed the results of his experimental investigations on the direct action of ethyl alcohol upon the heart. Professor Martin found that 15 cc. of absolute alcohol, diluted with nearly 60 cc. of water, given in one dose to a human subject who had been a total abstainer, caused no quickening of the pulse. The dose was, however, sufficiently large to cause dizziness. On the other hand, a little sweetened water occasioned in the same subject (who supposed he was taking alcohol) an almost immediate increase of four beats in the pulse-rate. This increase the experimenter attributed, however, more to the muscular exertion made in taking the liquid than to any other except psychical causes. Numerous other experiments were made upon dogs, to determine the direct and immediate action of alcohol upon the heart, both as to the rate of pulsation and as to the amount of work done in any given time. In order to eliminate the *indirect* action of the alcohol, — the effect that would be reflected from the central nervous system, — the heart and lungs of the animal were isolated from the rest of the body. Uniform respiration was kept up artificially. The heart was fed by defibrinated blood, previously obtained from other dogs, constant pressure being secured by Mariotte bottles. Certain of these bottles held blood containing a definite known percentage of alcohol. The blood in other bottles was free from alcohol. Certain stop-cocks made it possible to connect any of the bottles at will. The apparatus recorded the pulse-rate and the arterial

pressure automatically. Furthermore, the amount of blood pumped during any given period of time could be easily calculated. The two sorts of blood, one free from and the other containing alcohol, were alternately supplied for the space of one minute. To avoid ascribing to the alcohol any results that might be due to independent enfeeblement of the heart, all experiments in which the heart did not recover from the action of the alcohol were rejected.

It was found that alcohol, in proportions not directly poisonous, did not affect the rate of pulsation. Blood containing one-eighth per cent by volume of absolute alcohol did not affect the amount of work done. Blood containing one-fourth per cent by volume of absolute alcohol almost invariably diminished markedly the work done. Blood containing one-half per cent always diminished it, and might so reduce the amount pumped by the left ventricle that it was not sufficient to supply the coronary arteries. [One-fourth per cent of the blood of a man of 300 kilos weight would be about 15. This amount of alcohol is less than that contained in many a single drink of whiskey or brandy.]

The alcohol, in Professor Martin's opinion, did not act on the heart as it flowed through its cavities, but only when it reached the muscular and nervous tissues of the organ supplied by the coronary arteries and their ramifications. It was found, that, if the pericardial sac was cut away, blood containing one-half per cent of alcohol had little or no effect on the work done, even by the same heart that had been markedly influenced by blood containing the same percentage of alcohol before the pericardium was removed. It was found, furthermore, that, under the influence of alcoholic blood, the ventricles did not contract completely. Even at the height of the systole, the heart nearly or quite filled the pericardial sac. There was, therefore, little room for farther expansion during diastole, unless the surrounding sac was cut away. These facts led to the conclusion that the direct action of the alcohol upon the muscular fibres of the heart was more at first to diminish their tone and elasticity than their contractile power. The diminution of work was manifestly due to the disadvantage under which a flabby muscle

must act when it has not room for its full play in contraction and relaxation. However, blood containing one-fourth to one-half per cent of alcohol will in time decrease the work done, and finally reduce it to zero, even with the pericardium removed. One per cent of alcohol will produce the same result more speedily. Exactly *how* the alcohol acts on the ultimate muscular fibres of the heart, Professor Martin does not attempt to say. As alcoholic blood holds its oxygen more firmly, and, therefore, yields it less readily to the tissues, and as the heart in the previous experiments assumed an asphyxiated appearance, it is probable that at least part of the deleterious action of the alcohol is due to the deprivation of oxygen it causes.

Further experiments showed, that, if given by the stomach, a much larger percentage of alcohol was required to influence the blood pressure perceptibly. Either the absorption was so slow that the heart-poisoning limit was not at any moment reached, or, more probably, the alcohol was detained by the liver or other organs, and held back from the heart. One-fourth per cent introduced, in a saline solution, into the jugular vein, caused a temporary lowering of blood pressure; but the effect scarcely lasted longer than the brief period during which it was immediately coursing through the vessels of the heart itself. The blood evidently parted with its alcohol before it was returned to the heart, to such an extent, at least, that not enough was left to produce distinct results.

Professor Martin made no attempt to study the *chronic* action of alcohol, deeming that a pathological rather than a physiological question. (*N. Y. Med. Jour.*, Oct. 13, 1883.)

Effect of the Ethylic Alcohol Series on the Ventricle of the Frog's Heart.—Drs. Ringer and Sainsbury sum up their experiments as proving, —

1. The *qualitative similarity* of action of the different members of the alcoholic series.
2. The *general quantitative relationship*; viz., that, as the complexity of the molecule increases, the physiological activity increases.

3. The probability that each " CH_2 " group increases the activity by a definite amount. Higher alcohols are much more poisonous, and are direct paralyzers of the cardiac tissues, and present no stage of increased force of contraction. (*Practitioner*, May, 1883.)

Alcohol in Trichinosis.—Ferrer reports a case where alcohol constituted the only treatment of a case of trichinosis.

The attack was a severe one, and treatment commenced in, probably, the fifth week. The pulse was 124, temperature 39.75°C ., and there were muscular pains and rigidity. 190 cc. of proof spirit (about 56 per cent alcohol) were given daily, at intervals of feeding. Within twenty-four hours the temperature fell 4°C ., and the muscular rigidity was distinctly diminished. On the third day 280 cc. were given, and, the fourth, 360 cc.; but this amount was not borne well, and it was reduced again to 280 cc. On the sixth day the patient was free from pain as he lay in bed, and could move some of the limbs without suffering. The alcohol was continued in the same doses, and the patient was reported well in eighteen days. (*Gaceta de los Hospitales*; *Lond. Med. Record*, Nov. 15, 1883.)

Ammoniocal Inhalations.—Melsens, knowing the good effect the air of stables has in pulmonary consumption, thought that a continued but moderate respiration of air containing ammonia would be useful in other pulmonary affections. In many cases of bronchitis acute and chronic, bronchiectasis, emphysema, asthma, and acute laryngitis, he used a sachet of carbonate of ammonia with complete relief.

This treatment wants the equable, warm air of a stable, hence cannot be as efficient. (*Bull. de l'Académie belge*, 1881; *Bull. Gén. de Thérap.*, Feb. 15, 1883.)

Preliminary Note on the Treatment of Zymotic Pyrexia by Inhalation, and on the Use of Ammoniated Chloroform. By Benjamin Ward Richardson, M.D., F.R.S. (*Lancet*, June 9, 1883.)

As far back as 1853 Dr. Richardson treated a case of what

he then called phagedænic croup, by the inhalation of chloroform vapor in combination with the vapor of ammonia.

Recently he has recurred to the original plan of treatment, making it more easy in practice.

He says: Take a solution of ammonia in 838 alcohol, and mix it in equal parts with chloroform or methylene bichloride. Remove any water which results, and the ammoniated chloroform is ready for use. Then he puts a small amount (8.-10.) in a small Wolf's bottle, and connects the bottle with a leather inhaler armed with an expiratory valve.

The ammonia vapor is deprived of much of its pungency by the presence of the chloroform; and, as narcosis deepens, larger quantities can be inspired without cough or irritation. The effects he claims are:—

1. A sedative action and relief from pain, and repose if not actual sleep.
2. The ammonia maintains a fluidity of the blood and a freedom of secretion.
3. Under a combined action of the two vapors, there is a reduction of temperature, and an antiseptic result which is always favorable.

Amyl Nitrite in Intermittent Fever.—Dr. M. Larionoff, of Turkestan, has recently confirmed the statement of Dr. Saunders (*N. Y. Med. Record*, Jan. 17, 1880), that nitrite of amyl not only shortened the malarial paroxysms, but also cured the disease.

The case Larionoff relates was that of a soldier who had a quotidian marked by a rise of temperature to 40.° C., diarrhoea, with tenesmus, headache, giddiness, and convulsions.

On the fifth day there appeared trismus and rigidity of all (but respiratory) muscles of the body, with unconsciousness, complete anæsthesia, and coldness and pallor of the surface. The pulse was full, firm, and regular. After forty minutes of other methods of treatment, .50 cc. of amyl nitrite was put in the patient's nostrils, on cotton. Immediate relaxation took place, and consciousness returned. The patient soon got up, and asked for food. At the end of twenty minutes

the temperature had fallen to 38.25° C., and in two hours to the normal. (*Mediz. Obozr.*, February, 1882.)

Dr. Sassetzky, in the *Voenno-Mediz. Jour.*, September, 1879, in an article on the influence of amyl nitrite on febrile and non-febrile temperatures, concludes: (1) that it possesses not very energetic antipyretic properties; (2) that its antipyretic action is strongest in feverish patients, weaker in non-feverish patients, and still less pronounced in healthy persons; (3) that its antipyretic use is entirely free from any untoward symptoms, and is indicated especially in phthisical subjects, who bear nitrite of amyl better than cold baths, salicylate of sodium, and quinine. (*Lond. Med. Record*, Jan. 15, 1883.)

Treatment of Idiopathic Anæmia.—Padley concludes a paper on this subject, by stating that arsenic is a medicine exercising what may almost be termed a specific action in "idiopathic anæmia;" that in a clearly recognized case it is useless, and worse than useless, to pour in iron, and, unless as auxiliaries, other tonics; that arsenic appears to act best in its simple and uncombined form, and that its action is rather interfered with than otherwise by combination with iron; that the failure of iron, so potent in other forms of anæmia, serves as a kind of therapeutic diagnostic between these and idiopathic anæmia; and that the prognosis and directions for treatment of our chief authorities on medicine and therapeutics are—he says it with all deference—misleading and unduly discouraging, insomuch as they are either altogether silent upon, or enumerate cursorily with other medicines, the only agent which appears to have exercised a real and essential influence upon the disease, and which has undoubtedly been the means of rescuing a large proportion from its otherwise deadly power. (*Lancet*, Nov. 10 and 17, 1883.)

Treatment of Angina Pectoris.—Huchard puts as first in importance, in the treatment of the attack, inhalations of amyl nitrite; and, second, hypodermic injections of morphine. He says treatment by chloral, electricity, or metallotherapy is unwarrantable, because of their slowness and unreliability.

When syncope seems imminent, he advises the use of diffusible stimulants, — Hoffmann's anodyne, ether, ammonia, caffeine, punctate cauterization, hot applications, and perhaps the faradic brush.

He thinks amyl nitrite acts by stimulating the intramyocardic circulation, by producing relaxation of the spasm which obliterates the coronary arteries. It dilates the peripheral arteries, and increases the strength and working-power of the heart.

To prevent attacks, he advises strict hygienic treatment: to lead a quiet life in a dry atmosphere; avoid climbing and any fatiguing physical exercise; dispense with exciting foods; have many meals a day to avoid over-filling the stomach; an occasional period of milk-diet; abstinence from strong and spirituous liquors, moderation with tea and coffee; no tobacco, no sexual excesses, no fatigue of any sort, and no extensive movements of the left arm, which provoke attacks in some patients.

Of all medicaments directed against the disease, Huchard places the greatest reliance on the continued administration of the iodide of potassium.

While not pretending to know the *modus operandi* of the drug in these cases, he is inclined to think with Brown-Séquard that it relieves by improving the nutrition of the nervous centres, as good nutrition lessens their reflex excitability.

He does not ignore the fact that the drug may relieve by curing a possible aortitis. (*Rev. de Méd.*, Sept. 10, 1883.)

Experiments to determine the Germicide Value of Therapeutic Agents. — Sternberg gives a list of antiseptics, with the percentages in which they destroy the micrococcus of pus, as follows: —

Mercuric bichloride	. . . . .	0.005 per cent.
Potassium permanganate	. . . . .	0.12 "
Iodine . . . . .	. . . . .	0.2 "
Creosote . . . . .	. . . . .	0.5 "
Sulphuric acid . . . . .	. . . . .	0.5 "
Carbolic acid . . . . .	. . . . .	1.0 "

Hydrochloric acid	1.	per cent.
Zinc chloride	2.	"
Tincture chloride of iron	4.	"
Salicylic acid, dissolved by sodium borate	4.	"
Caustic potash	10.	"
Citric acid	12.	"
Chloral hydrate	20.	"

Experiments with the same agents show their powers remain relatively the same when tried with the micrococcus of septicæmia in the rabbit, the bacterium termo, or broken-down beef-tea.

These same agents will prevent the formation of the various organisms mentioned, in about the same relative proportions, but in much less amounts. (*Am. Jour. Med. Sci.*, April, 1883.)

The Influence of Certain Antiseptics on Vaccine Lymph.

—Pott has experimented with carbolic acid, salicylic acid, borax, and thymol; and the solutions were, in all cases, mixed with the lymph in equal proportions, and either employed directly or sealed in tubes, and reserved for subsequent experiment. The vaccination was always primary, and the lymph humanized.

Fresh lymph with five per cent of carbolic acid proved inert.

Carbolized lymph twelve months old failed in one-half the cases when of the strength of one per cent, and in all the cases when the solution was of a two, three, or four per cent strength.

Fresh lymph with one-third per cent of salicylic acid was usually successful, but when from six to twelve months old it was inert.

Fresh lymph with a three and one-half per cent borax solution was active, and about one-half of old specimens of the mixture remained active.

The author considers a solution of borax the best to dilute lymph when the supply is limited.

Thymol does not render vaccine less active. (*Archiv für Kinderheilkunde*, Band iv., Heft 11; *Lond. Med. Record*, Oct. 15, 1883.)

Comparative Value of different Antiseptics. — Leonardi gives the power of sterilization of a given quantity of an alterable liquid by different antiseptics as follows: Ozone, small fraction; oxygenated water, 1; bichloride of mercury, 5; hydrocyanic acid, 8; bromine, 12; chloroform, 300; potassic bichromate, 250; thymic acid, 400; carbolic acid, 600; potassic permanganate, 650; salicylic acid, 650; alum, 950; arsenious acid, 1,200; boracic acid, 1,500; arseniate of soda, 1,500; salicylate of soda, 2,000; borate of soda, 10,000; hydrochlorate of morphia, 14,000; alcohol, 15,000. To sterilize air, ozone is the most active, and is incomparably more efficacious than the ordinary substances used. It is most readily obtained by diffusing oil of turpentine in the air. (*Gaz. Med. Ital. Prov. Veneto*, Sept. 1, 1883; *Lond. Med. Record*, Dec. 15, 1883.)

Treatment of acute Aortitis. — Bornèque has especially studied acute aortitis, and considers it characterized by a proliferation of embryonic cells, and by the development of blood-vessels in the entire thickness of the vessel walls.

It appears under three forms, — the truly acute; as co-existing with old changes; and in the ulcerous form.

When it occurs in precocious senility, the symptoms are well defined.

To relieve the dyspnœa and pain, use blisters, wet cups, acupuncture, actual cautery, tincture of iodine, in the region of the origin of the aorta. Hypodermic injections of the hydrochlorate of morphine morning and night, or oftener, relieve the pain and dyspnœa. Sometimes chloral will relieve the paroxysms of pain, but it should be used with caution. When the disease becomes more or less chronic, the iodide and bromide of potash are indicated. The prolonged use of these drugs seems to have a decided resolvent effect. Bitter and ferruginous tonics should be given. Fatigue, violent efforts, and excesses of all kinds, should be prohibited. (*Thèse de Paris*, 1883; *Rev. de Thérap.*, June 1, 1883.)

Arbutine. — Menche of Bonn describes arbutine as a glucoside extracted from the leaves of the uva ursi. It consists of white, fine, non-deliquescent needles. It is soluble

in water, is of neutral re-action, odorless, and has a slightly bitter taste. The author praises its diuretic power, and says it is chiefly indicated in catarrhal affections of the ureters and bladder (3.-4. per day). He finds it is eliminated in the urine as hydroquinone. This may account for its beneficial effects on inflammatory conditions of the upper urinary tracts, as it is advised as an injection in gonorrhœa by Brieger. — (*Das Arbutin als Arzneimittel*; abstracted in *Prog. Méd.*, Aug. 4, 1883.)

Arsenic. — Warfvinge reports two cases of leukæmia treated with arsenic. One was a mild ganglionic form apparently cured. The enlarged lymphatics shrunk away, and the white blood corpuscles regained their normal proportions to the red.

The other was a splenic case, with an enormous spleen and white globules equal in number to the red. A three-months treatment reduced the size of the spleen considerably, and reduced the white globules to the proportion of 1-10.

In five cases of pseudoleukæmia, only temporary amelioration took place; no cures. Of seven patients with progressive, pernicious anæmia, five died after some months of improvement; two were cured. (*Om behandling af leukæmi, pseudoleukæmi, och perniciös progressiv anæmi, med arsenik*; F. W. WARFWINGE, *Nordiskt Med. Arch.*, No. 5, fasc. 1, 1883; *Rev. des Sci. Méd.*, October, 1883. See *Vorstellung eines Falles von Heilung maligner Lymphome durch Arsenik*; J. ISRAEL, *Berlin. klin. Woch.*, Dec. 27, 1880. *Eine eigenthümliche Heilung eines bösartigen Lymphosarcomes am Halse*; BUSCH, *idem*, Aug. 22, 1881. *Malignes Lymphome und Solutio Fowleri*; ZESAS, *Wien. med. Woch.*, No. 52, 1882.)

Injections of Arsenic in General Sarcomatosis. — Professor Köbner reports a case which still further confirms the value of Fowler's solution of arsenic in cutaneous diseases. Two years ago the patient, who was eight and a half years old, and has always been delicate, developed sarcomatosis of the skin, which gradually spread until almost the whole cutaneous surface was affected. Köbner commenced injecting Fowler's solution in distilled water, in proportions of one to

two; from two and a half to four drops of the arsenical solution being used at each injection, thrown under the skin or into the muscular tissue of the gluteal region, and into the stroma of some of the larger tumors. In three months five injections were made, 3ij. of Fowler's solution being used. At the end of three months the tumors were considerably diminished, having disappeared in some places, leaving a brownish cicatrix. Equal parts of the arsenic solution and distilled water were then used, six to nine drops being injected; in about forty days 3iv. of Fowler's solution being used, with progressive amelioration of the symptoms, the lymphatic glands being greatly reduced in size, and the liver and spleen reduced to the normal diameter. The quantity injected was then gradually reduced; and in one year from the commencement of treatment, nothing was left of the disease except a few cicatrices showing the former position of some of the larger tumors. (*Gaz. degli Ospitali*, May 13, 1883; *Med. News*, June, 1883.)

Treatment of Catarrhal Asthma. — Trastour advises the following treatment for catarrhal asthmatics, or asthmatics who have become catarrhal: —

1. To modify the circulation. Bleeding, or one or more applications of leeches, repeated p. r. n.

2. To diminish morbid secretions. Persevering application of blisters, at longer or shorter intervals, on the chest. Daily frictions of the entire surface of the body with a hair mitten or brush. An occasional wet pack or douche. Tar, encalyptol, turpentine, carbolic acid, or, as he prefers, creosote.

3. To combat the chronic inflammation, and bring about trophic changes, he advises sulphur, but principally iodine; and of this he thinks the best form is the iodide of calcium.

4. As to antispasmodics and sedatives, he has no preference: without any special indication, he is guided in his choice by personal experimentation on the patient. Morphine, however, is by far the best. (*Bull. Gén. de Thérap.*, Feb. 28, 1883.)

Treatment of Permanent Asthma.—Talamon and Eloy, in an article describing well the disease in its clinical aspects, and in its relation to chronic emphysema, advise, as the most reliable treatment of permanent asthma, the giving of the iodide of potassium in doses of 2.-3. a day (not in .25-.50 doses as recommended, but abandoned, by Trousseau). This treatment, well followed, stops the exacerbations, lessens the continuous dyspnœa, and checks the cough and catarrh. (*L'Union Méd.*, March 6, 1883.)

Investigations into the Physiological Action of Barium Chloride. By Sydney Ringer, M.D., F.R.C.P., and Harrington Sainsbury, M.D., M.R.C.P.

The element barium belongs to the group of the metals of the alkaline earths, and chemically stands, to the other members of this group, viz., strontium and calcium, as cæsium does to the elements rubidium and potassium, from the group of the metals of the alkalis.

Calcium we know to be a necessary constituent of the organism,—to rank, in fact, as a food; but inasmuch as experimental evidence has abundantly shown, for the chemically allied elements sodium and potassium, that chemical analogy does not necessarily involve physiological analogy, so here we are not surprised to find that the evidence, so far as it goes, shows the chemically yet more closely allied elements calcium and barium to be very widely separated physiologically.

Concerning the action of the element barium, but little is known therapeutically, though it has been employed thus: it is, however, recognized as a toxic agent. Physiologically, it has more recently been investigated by R. Boehm.¹ In this paper, he refers, under the literature of the subject, to Hufeland's statement that the salts of barium were not toxic; and to the explanation, by the same authority, of the opposing results which Arnemann and Girtauner had obtained, as due to the presence of arsenic, etc., as impurities. The evidence of Brodie, Orfila, and Gmelin, is then quoted,

¹ Ueber die Wirkungen der Barytsalze auf den Thierkörper; *Archiv für experimentelle Pathologie und Pharmakologie*, 1875, iii., pp. 216-251. See also *Handbuch der gerichtlichen Medicin-Vergiftungen*, 1882.

as disproving Hufeland's teaching; whilst Gmelin is made to sum up the action of barium salts thus: as chiefly on brain and cord; as destroying the irritability of voluntary, but not of involuntary, muscles; as causing inflammation of the stomach; as influencing the heart's action.

Reference is then made to Blake (*Edinburgh Med. and Surg. Jour.*, 1841), as recording increased blood-pressure and final heart-paralysis; also to Mialhe, and, later, to Onsum's theory, that the action of barium was by embolism, insoluble barium sulphate being formed in the tissues, with subsequent capillary obstruction. Cyon, 1866, denies the evidence of embolism, and explains the nature of the toxic action as did Gmelin. Finally, James Blake (*Jour. of Anat. and Physiol.*, 1874, i.) is quoted as stating for barium, strontium, and calcium, that, when injected into the arteries so that the heart receives the dose gradually, the cardiac paralyzant action is inversely as the atomic weight of the base.

Boehm's own experiments were, for the most part, with chloride of barium; but experiments with the nitrate and the acetate showed that "the effect was due to the base, and was only influenced by the degree of solubility of the salt chosen." (We have here another illustration of a law which the salts of potassium exemplify well, viz., that the action of the base may be traced in each of its salts.) The salts were tried on frogs, on hares, rabbits, cats, and dogs: and, besides the general effects, those on the circulatory system in particular were noted. Boehm gives the following summary:—

1. The activity of the heart, both for cold and warm blooded animals, is increased by barium salts: in mammals, systolic arrest of the left ventricle obtains always; in frogs, systolic arrest of the ventricle obtains frequently.
2. The small arteries are, most probably, much diminished in calibre; whether by nervous action, or direct action on the muscular tissue, is doubtful.
3. The endings of the inhibitory vagus are paralyzed.
4. The centripetal excitability of the depressor nerve is not destroyed.
5. An enormous rise in blood-pressure, and a lessening

of the pulse-rate, occur; this with moderate doses: larger doses paralyze the heart, probably the intracardiac ganglion apparatus.

As to the other effects, Boehm states that the respiratory disturbances are clearly of central origin, the consequences of central irritation; that the asphyxia is secondary to cardiac paralysis; that the stormy gastro-intestinal symptoms (diarrhoea and vomiting) are due to an enormous increase in the activity of the hollow viscera; that the bladder suffers similarly, but that no marked changes are to be discerned in the mucous membranes. Boehm concludes that either the whole sympathetic system is strongly affected, or unstripped muscular tissue generally and specifically.

To pass from these experimental effects on animals, to those observed in man in poisoning cases, we find, in works on toxicology, special mention of palpitation¹ as a symptom of barium poisoning: purging and vomiting are also specially referred to, but are somewhat variously explained; for, whilst Woodman and Tidy describe very marked changes in the mucous membrane of the alimentary tract, Schuchardt, in Maschka's *Handbuch*, notes almost complete absence of marked changes here. Marked frequency of micturition is also noted as a symptom. *Post mortem*, Woodman and Tidy describe both sides of the heart as distended with blood. This last statement is in opposition to the experimental results of Boehm; but independently of precise agreement, or of modes of explaining, we already sufficiently see that the gap between barium and calcium is, physiologically, a very wide one.

To return, however, to the discrepancies above noted, we may remark, that toxicology in very many instances affords but the roughest of experiments; and, further, that, as we ascend in the animal kingdom, the element shock increases to the extent of masking, in many cases, the direct action of the particular agent on particular tissues: it is thus, perhaps, that the diastolic heart in poisoning cases may be explained.

¹ See Guy and Ferrier; also Woodman and Tidy's *Handbook of Forensic Medicine and Toxicology*; also Maschka's *Handbuch der gerichtlichen Medicin*, Band ii., p. 173.

The present experiments were undertaken in order to attempt to clear up some points in the problem. Obviously, as the question now stands, the main point for decision is, whether barium acts directly on the tissues in which it manifests itself, or indirectly on these through the medium of the nerves? This question has been taken up by Dr. Gaskell, with respect to the vascular system.¹ His experiments were principally with acids and alkalies; and from them he was led to conclude that the dilated and contracted states of the arterioles, following on the circulation, respectively, of an acid and alkaline fluid, were due to the direct action of the acid and alkali on the plain muscular fibres. He was thus led to speak of acid and alkali like actions, and to infer that drugs, acting directly on the vessels, would class themselves in these two lines. Dr. Gaskell's line of argument was a somewhat different one to that which concerns us: for the question of local nervous mechanisms was then considered; whilst that which we have to decide upon is — given systolic arrest of the ventricle, and rise in the blood-pressure, as the result of poisoning the entire organism, is this the result of direct action, or of action through the nervous system? Action on local nervous mechanism would, in this problem, count as direct action.

To answer this question, our first experiments were with pithed frogs. The method of experimentation was as follows: Three frogs were selected, as nearly of a size as might be; all three were pithed, and the hearts exposed *in situ*. In this pithing, the cord was cut through in the interval between the occipital and the first vertebra; and the brain, with the portion of the medulla oblongata above the section, destroyed, and the brain-cavity plugged to prevent hemorrhage. The cord below the section was left intact with certain of the frogs. This section is so close to the origin of the vagi from the medulla oblongata, that we may take it as most probable that their centres are destroyed in this process of pithing. In order, however, to be sure of this, the upper part of the cord below the section was destroyed, in certain other frogs, by means of a hot wire. In such it was

¹ Journal of Physiology, vol. iii., No. 1, August, 1880.

certain that both the vagal and vaso-motor centres were destroyed, and accordingly an impulse could not possibly be reflected either on to heart or blood-vessels; apparent impulses could not control either system. This is, of course, assuming the absence of vaso-motor centres low down in the cord, which is probably a working hypothesis.

After the exposure of the hearts, the pulse-rate was counted; and then again for two or three times, at intervals of ten minutes, to allow of the shock following the pithing and exposure passing off. Then the barium chloride¹ was injected into two of the frogs, the third being kept as a control-frog. Seven such experiments (twenty-one frogs) were performed, and the results uniformly were as follows:—

1. Increased vigor of action of the heart followed the barium chloride injection. This was most marked in the action of the ventricle: with increasing dose, the diastole of the latter became less and less complete, up to the final stage of systolic ventricular arrest. In many cases, the effects following a first dose would gradually pass off, to be again brought out on again injecting more of the drug.

2. The production of incoördinate ventricular action, so common with digitalis, was also commonly witnessed here.

3. The effects on the pulse-rate were less satisfactory: retardation was the rule; and, in one marked case of slowing, the ventricular rhythm was noted to be just one-half as frequent as the auricular. In this case, the upper half of the cord had been destroyed. In another case, however, in which this had been done, very decided acceleration followed the injection. In the case of four of the frogs, the barium chloride was without notable effect. Sources of error in the estimation of the pulse-rate are the movements of the animal, which, after the above-described method of destroying the brain, are at times a little difficult to control, the frog attempting to regain the ventral position. It was for this reason the experiment of simply destroying the cerebral hemispheres was not performed.

¹ A ten per cent solution of barium chloride, free of water of crystallization was used; of this as much as .5 to .7 cc., in doses of .1 cc., was injected.

The retardation of the pulse-rate clinically observed in the employment of digitalis is held by Schmiedeberg¹ to be due to the rise in blood-pressure; and inasmuch as retardation is recorded for barium chloride,² and as its further heart effects resemble those of digitalis so closely, the above-recorded experiments were chiefly for the purpose of ascertaining if this slowing could obtain after the heart could no longer be influenced centrally through the vagi. We find that such retardation can obtain, and, therefore, that this action on the heart cannot be a reflex one. Nor can the increased vigor of the ventricle, its incoördination, and its systolic arrest, be the result of a reflex influence.

The following experiments with the excised heart, undertaken with another view, — viz., that of comparing the effects of the chlorides of barium, calcium, and magnesium, — answer the last question yet more definitely.

Mode of Experimentation. — The excised frog-heart was tied on to the perfusion cannula of a Roy apparatus, and fed with an artificial blood-mixture.³ The ligature was placed as nearly as might be in the auriculo-ventricular groove. Of the blood-mixture, one hundred cubic centimetres were taken for each experiment. The dose of the drug was kept uniform, and added every quarter-revolution of the cylinder. It was sufficiently large to bring the experiment to an end within about the hour. (It must be borne in mind, that we are here working with a very complex fluid, and that the results hence will not be comparable with those gained with a comparatively simple fluid.⁴)

The experiments were made in December, 1882, and January, 1883.

For the purpose of exciting the heart, break-shocks alone were employed, except in the cases in which it was wished to observe the modifying influence of the drug on the effect of continuous faradization applied to the heart.

¹ *Archiv für experimentelle Pathologie und Pharmakologie*, Band xvi.

² Boehm, *op. cit.*

³ A solution of dried bullock's blood in ordinary tap-water so as to represent normal blood, and further diluted with two and a half times its volume of tap-water saline.

⁴ *Vide* paper in *The Practitioner*.

The solution strength was ten per cent of anhydrous barium chloride. It was very faintly acid.

Of the results obtained, we will here mention only that the heart was arrested in full systole; whilst, at the same time, it was noted that the barium salt would either start rhythmic action, or would increase the frequency of already existing spontaneous action. These two facts, then, are to be noted: systolic arrest, and the tendency to excite or promote spontaneous action; and this as the result of direct action on the cardiac tissue. The further results obtained by this method of experimentation will be reserved till the chlorides of magnesium and calcium are treated of.

We have seen, thus, the effects of barium chloride on the entire organism (in Boehm's experiments), on the organism with the heart and vessels loosed from central control, and, finally, directly on the tissues of the excised heart. In each case, we have seen persistent spasm of the muscular tissue excited. It may here further be recorded, that the direct application of a one-per-cent solution of barium chloride to the heart *in situ* will produce a local spasm at the point of application.

This being the action on the muscular tissue of the heart, the question next for solution was, What is the action on the muscular tissue of the vascular system generally? is it local, or is it through the nerves? To answer this, the method of experimentation of Gaskell with the acids and alkalies was adopted. The tortoise, however, was chosen in place of the frog; the former animal being, for one thing, more convenient to handle on account of the larger size of the vessels, whilst a further advantage was to be found in the extreme pertinacity of life of its tissues.

Mode of Experimentation.—The animal was pithed, its shell sawn in half, and a cannula tied into the abdominal aorta. Special care was observed, in the pithing, to endeavor to destroy the cord as completely as possible. The cannula was fed by simple siphon action with the required fluids, the hinder half of the body only being used in the experiment. The flow was into the tissues by the abdominal aorta, and out through the cut veins. The preparation was

placed on a tilted glass plate, and the fluid escaping from the veins caught and carefully measured. The plan of measuring the through flow in a given interval of time was adopted.

The pressure varied in the different experiments, but, during each experiment, was maintained constant within about 0.5 centimetre by constant additions to the supply-vessel, which was of large capacity so as to retard changes in level.

Results.—In the first experiment, on May 2, 1883 (temperature of room, 16.5° C.; head of pressure = 19 centimetres), the method of counting the rate of flow by the number of drops per minute at definite intervals of time was adopted. Saline solution 0.6 per cent (tap-water saline) was first circulated, then replaced by saline solution + barium chloride 1 per cent; with 10 cc. of this solution in 100 cc. of saline, the flow rapidly fell to one-half the original rate.

In the next experiment, on May 5, the quantity escaping in a given interval of time (every five minutes) was measured. The head of pressure, 23.5 centimetres; the rate of flow quickly fell from 7 cc. in five minutes for saline solution, to 2 cc. in five minutes for barium saline (1 cc. of 1 per cent barium chloride in 100 cc. saline).

The next experiment will be given in full.

May 7. Temperature of room, 17° C.; head of pressure, 28 centimetres.

The following numbers were observed:—

	Outflow per 5 minutes.		Outflow per 5 minutes.
Saline solution 0.6 per cent supplied.	40.6 cc. 31 34 31 28	Barium solution replaced	20 cc. 23.3 21 19.2 11.8 6.2 3.8
Barium chloride, 10 per cent, 1 cc. in 100 cc. saline.	20 16 8 4.2 3.1 4.2 2.5 2.8		
Saline replaced	4.5 5.7 8.4 14.4 15.5 21.8 21.7	Saline replaced	3.8 3.9 2.7 4.6 11 14 19 24

It is to be noted that the washing-out of the barium chloride by saline was a slow process, and that the original quick rate of flow was not regained.

May 10. Temperature of room, 14°; pressure, 30 centimetres.

	Outflow per 5 minutes.		Outflow per 5 minutes.
Saline solution 0.6 per cent supplied.	44 cc. 48 44 47	Barium solution replaced	24 cc. 21 15 11
Barium chloride 1 per cent 2 cc. in 100 cc. saline.	33 19 15 14 12 11		
Saline replaced	14 22 21 25	Saline solution with 1 cc. KCl. 1 per cent in the 100 cc. saline.	9 24 32 40 40 34 40

In this latter experiment, it will be noted that a much weaker solution of barium chloride was used, — 1 per cent; the percentage quantity of the salt present in the circulating solution being 1 per 5,000. In both of the last experiments, the alternation of effect with the presence and absence of drug is clearly convincing; and the fact of the replacement of the second barium effect by a freer through-flow, on again circulating saline, demonstrates the persistence of vitality of the tissues to the end of the experiment, showing that the barium effect cannot be explained as simply physical. The addition of the small quantity of potassium chloride to the saline, in the end-stage of the second experiment, was simply for the purpose of seeing if a well-known arrester of the cardiac diastole would aid in dilating the vessels: whether it did so, or not, is unimportant here, since that which alone concerns us is that the vessels did dilate, and hence retained their vitality.

This, then, represents the action of barium chloride on the vessels uncontrolled by central nervous agency; and the influence of the salt in exciting spasm of the arterioles by its direct action upon them may be considered as fairly established. But, given a more vigorously acting ventricle,

which is what we have to note in the first stage of barium chloride action, then spasm of the arterioles serving, as it must do, to dam back the blood, will of necessity lead to heightened blood-pressure; and this Boehm's experiments have shown to be a very notable effect of the salt. (It is not unlikely that the sequence of events has been reversed above, and that spasm of the arterioles as a first effect is followed by more energetic action of the ventricle, to meet the increased obstruction on the arterial side.) Boehm further records (*op. cit.*), that, after the administration of barium chloride, section of the cord below the vaso-motor centre was almost without effect on the heightened blood-pressure: this observation, as also that of a curiously beaded appearance of the arteries of the mesentery, are both in accordance with direct local action.

To complete the argument, the following experiment was performed. The cerebral and optic lobes were destroyed: there was thus the whole thickness of the cerebellum at least between the surface of section and the fourth ventricle, and we may take it that the vaso-motor centre was certainly uninjured. From the brainless tortoise the whole abdominal shell-wall was then removed; care being taken, as far as possible, to avoid wounding the vessels, especially the large abdominal veins. The peritoneum was then opened by a longitudinal incision, and the descending aorta exposed, ligatured proximally, and a cannula tied in distally. The large vein running up in front of the right lung to the liver was then exposed, and ligatured proximally; similarly, the two large veins in the anterior abdominal wall were proximally ligatured. All three veins were then opened distally, and the saline circulation started, as in the previous experiments. By the means adopted, a free outlet from the veins was provided for the inflowing saline, and the escaping fluid could be caught and measured, as in the foregoing experiments. The vessels, moreover, through which the saline was flowing, were under central nervous control, since the nervous system, including the vaso-motor centre, was intact; and at the same time it was possible to influence the nervous system by introducing the poison into the circulation of the

anterior half of the body. This last was, in the first instance, attempted by injection into the subcutaneous tissue in the region of the neck; but subsequently, in order to make sure of the entry of the poison into the systemic circulation, it was introduced through a cannula tied proximally into one of the veins of the anterior abdominal wall.

Two experiments with barium chloride after this method were unsuccessful, for some reason or other: i.e., the results were purely negative; the introduction of the poison into the anterior circulation was without effect on the saline circulation; and, similarly, the addition of barium chloride to the saline circulation itself was without effect,—a fact almost proving some flaw in the operations, since the direct action on the tissues had come out so clearly. The third experiment proved a complete success, and we here record it.

July 4. Temperature of room, 21° C.; pressure in the saline circulation = 30 centimetres.

	Outflow from saline circula- tion per 5 minutes.		Outflow from saline circula- tion per 5 minutes.
0.1 cc. Ba Cl ₂ 10 per cent diluted with 0.9 cc. saline injected into cardiac cir- culation.	53 cc.	Injection of 0.2 cc. Ba Cl ₂ + 0.8 cc. saline. In all 0.4 cc. of the barium chloride had been used.	58 cc.
	52		60
	48	Injection of 0.1 cc. Ba Cl ₂ + 0.9 cc. saline = 0.5 cc. of barium chloride.	56
	46		60
	44		53
	48		50
	48		50
Injection of same quantity Ba Cl ₂ repeated.	54	Ba Cl ₂ 0.5 cc. added to 100 cc. of the circulating sa- line.	40
	59		30
			18
			12
			3
			6

Thus, then, the poison, though it must have been pumped by the heart to the vaso-motor centre, was yet unable to influence the vessels of the hinder extremities, which, however, responded at once to the direct local action of the barium chloride.

It may be objected, that the very free vascular anastomosis which obtains in the tortoise scarcely renders practicable the isolation of the one circulation from the other. This objection would certainly be a valid one, had we got a positive

result, —i.e., had the injection of the poison into the anterior circulation caused contraction of the vessels of the posterior circulation, — since the poison might have entered through the anastomosis, and have affected the tissues directly; but it can scarcely hold for a negative result such as was here obtained.

This ends the experiments: we may just briefly recapitulate the steps in the argument.

1. We have the experiments of Boehm, showing the systolic heart, the retarded pulse-rate, and the heightened blood-pressure, resulting from barium chloride action.

2. We find that the systolic heart and the retardation occur equally when the centres of reflex control are destroyed.

3. We find that the local application of the salt, in diluted solution, to the heart *in situ*, produces local spasm at the point of application, and also that the excised heart is arrested in full systole by the drug.

4. We find that the vessels freed from central nervous control respond to the direct action of the salt.

5. We find that we are unable to influence the calibre of the vessels through the nerves apart from direct local action.

We here see, that the action on the heart is a guide to the action on the arterioles, or *vice versa*; and this we should be inclined to expect, since, on tissues resembling one another, we should look for a resemblance of effects. This question will be gone into more fully in a paper shortly to be published, on the digitalis group generally, in respect of which the experiments were conducted after the same methods described here.

To the marked resemblance in action between barium chloride and digitalis, we need scarcely draw further attention. Boehm pointed it out, and it is sufficiently manifest. But of the alternative which he gave us for barium chloride action, — viz., either action on the whole sympathetic system, or on unstriped muscular tissue generally and specifically, — we must choose the latter.

The therapeutic value of barium chloride yet remains to

be determined. The drug is clearly a very powerful one, and in this respect is widely separated from its chemical analogue calcium chloride. As to the directions in which clinical observation should extend, we get a clear indication from the digitalis-like action of the drug. (*Br. Med. Jour.*, Aug. 11, 1883.)

The Treatment of Basedow's Disease. — From an experience in upward of seventy cases, and fortified by the unanimous observations of Von Dusch, Eulenburg, Meyer, Erb, and others, Dr. Chvostek is led to regard the rational employment of galvanism as the most important part of the treatment of Basedow's disease. He recommends the following method to be pursued: 1st, the ascending constant current applied to the cervical sympathetic, on each side, for at the most one minute; 2d, the same to the spinal cord (the anode at about the fifth dorsal spine, the cathode high up in the cervical region); 3d, through the occiput (one pole at each mastoid process), and in certain cases also through the temples, a constant current, for at the longest one minute, and so weak that the patient can feel but the slightest sensation of burning; sometimes also local galvanization of the thyroid gland with a weak constant current for about four minutes, the current to be reversed at the end of each minute. The applications should be made every day if possible. As a rule, very good results were obtained; even in the most severe cases, a cure or marked improvement being recorded. In three cases, death resulted from excessive anæmia or complications. (*Centralbl. für klin. Med.*, June 23, 1883; *N. Y. Med. Record*, Aug. 18, 1883.)

Bismuth Treatment of Wounds. — Dr. Riedel of Aix read a paper before the Twelfth Congress of the German Surgical Association, on the bismuth treatment of wounds in the hospital at Aix-la-Chapelle, during January, February, and March, 1883. His results with this treatment corresponded very nearly with those of Kocher. He had been careful to follow the directions of the latter, except that he omitted the secondary suture, but had used the primary suture and drainage. The bismuth dressing had given good

results, both in fresh wounds and operations, and in those in which suppuration had occurred. Though he thought that bismuth was a good antiseptic, yet it was not an unfailing one. In sixty-one cases in which it was used, there were four phlegmons, and eight cases of erysipelas. Even with a combination of bismuth and corrosive sublimate, there was one case of erysipelas in a patient who had a putrid compound fracture of the humerus. The beneficial results of the bismuth seemed to be due to its dryness and its power of suppressing secretions. He had seen no symptoms of poisoning from the use of it.

In the discussion on this paper, Kocher said that a continued use of bismuth had increased his confidence in it as a dressing, and he thought that it promoted union by first intention. Dr. von Langenbeck had had but little experience in this treatment since leaving Berlin. When he used it, he had closed the wound immediately, and inserted a drainage-tube, which he removed by the end of the second day. He would fear to fill a cavity with bismuth, for fear of poisoning. As compared with iodoform, it had the disadvantage of never forming a scab. He referred to a case in which he had extirpated an angioma from the inner side of the thigh. The resulting wound was a large hole, the walls formed of muscles which moved with every change in the position of the body, and which seemed very unfavorable for union by first intention. The wound was sprinkled with water in which bismuth was suspended, a drainage-tube was put in, the edges nicely brought together, and the whole covered with a bismuth compress. The drainage-tube was removed on the second day, and the wound healed by first intention. Dr. Israel had used bismuth after extirpation of a carcinomatous breast, and regretted it. Though the wound healed in ten days, gangrenous stomatitis was developed, which lasted for eight weeks. Lately the patient had come back to be treated for numerous nodules, about the size of a cherry, in the vicinity of the cicatrix. Incisions showed them to be small collections of bismuth. (*Deut. med. Woch.*, Nos. 16 and 17, 1883; *Am. Jour. Med. Sci.*, July, 1883.)

Treatment of Fetid Perspiration of the Feet by Sub-nitrate of Bismuth. (*Gaz. Hébd.*, July 27, 1883.)

Vieusse concludes :—

1. That exaggerated sweating of the feet, of any form, whether a simple hypersecretion, or accompanied by acute pain, or marked by a fetid smell, is easily cured by rubbing the diseased parts with powdered sub-nitrate of bismuth.
2. That the common opinion, that suppression of the sweat produces numberless metastatic complications, is false.
3. That the action of the drug is purely local, and renders the skin harder and more resistant, having also an influence on the quality and quantity of the sudoriparous and sebaceous secretions. An effect on the capillary circulation is also possible.
4. Occasionally the hypersecretion of sweat is only temporarily checked, while the fetid odor, and pain in the feet, are permanently checked.

Sub-nitrate of Bismuth as a Surgical Dressing. (*N. Y. Med. Jour.*, Nov. 10, 1883, 522.)¹

At a meeting of the New-York Medical and Surgical Society, Dr. Post related a case in which he practised multiple incisions, for relief of cicatricial deformity from a burn. The resulting wounds, fourteen in number, were sprinkled with bismuth, which formed a sort of scab, repressing exuberant granulation, and preventing inflammation. The powder was renewed at each dressing, and the wounds healed in from four to six weeks. He has since used the dressing with great satisfaction, especially in burns, where it prevents excessive granulation and consequent deformity. No toxic effects have been observed. The bismuth dressing, recommended by Kocher, has given excellent results in the hands of Riedel. (*Gaz. Méd. de Paris*, May 12, 1883, 224.) It seems to dry up secretion, and hasten closure of the wound. In experiments on animals, the latter effect was observed in wounds of the pleura and peritoneum. This is said to be due to the plastic action of azotic acid, which is continually formed in small quantity. The occasional occurrence of ery-

¹ Abstracted by Dr. C. H. Knight.

sipelas as a complication under its use has led to its combination with corrosive sublimate. Thus combined, no case of phlegmon, and only one of erysipelas, occurred in twenty-three cases.

Von Langenbeck also has had satisfactory results with bismuth. But Israel reports a case of poisoning from its use after amputation of the breast for cancer. Gangrenous stomatitis developed, and the patient was in a very precarious condition from inability to take food. Deposits of bismuth took place beneath the mucous membrane; and for several weeks little nodules formed in the breast about the cicatrix, which proved to be due to the same cause. It is thought, that, in this case, the bismuth was applied too freely.

Boracic Acid. — King has used boracic acid successfully in various affections of the mucous membranes. Four cases of vaginitis in girls were promptly relieved. In leucorrhœa due to cervical catarrh, tampons with boro-glycerine or boracic acid in powder relieved. In a case of ozæna of forty years' duration, boro-glycerine (2.-10.) applied on cotton gave considerable relief. In pharyngitis with post-nasal catarrh, it was also beneficial. (*Memorabilien*, Dec. 30, 1882; *N. Y. Med. Record*, Feb. 24, 1883.)

Chéron finds, that, in blennorrhagic vaginitis and urethritis, boric acid has many advantages over and above its antiseptic qualities. It is well borne by diseased mucous membranes, without pain. It makes a colorless solution. It is cheap, and its antiseptic powers rank high.

Its poor solubility in water is a disadvantage. With warm glycerine it forms a sort of gelatinous cream, very soluble in warm water: in this way, five times more acid can be dissolved in water, or fifteen per cent.

In purulent vaginitis, this glycerite can be used by means of tampons, or, better, by means of irrigations twice daily, — three to four teaspoonfuls to the litre of water.

In a purulent urethritis, one should use once a day an injection into the bladder, of one teaspoonful of the glycerite in 60 cc. of tepid water. (*Traitement de la Vaginite et de l'Urétrite blennorrhagiques*; *Rev. de Thérap.*, June 1, 1883.)

Upon the Physiological Action of the Borate of Soda, and its Elimination by the Salivary Glands. By Ferdinand Vigier.¹

Polli of Milan states, that 15.-20. of the borate, and 4.-5. of boric acid, are maximum doses for twenty-four hours. Papillon and Rabuteau have injected 2.-4. of the borate into the veins of dogs, without accident.

Jourdes thinks borax is a better preservative when used in small quantities only.

Cyon claims that borax is not only harmless, but it also aids nutrition; that, in quantities of 12. a day, it can be used in nourishment, without provoking the least disturbance in general nutrition; that borax, substituted for common salt, aids the assimilation of food, and causes an increase in weight, even when the food is albuminoid.

These statements are of importance; because it may be, that, in this way, meat and other articles of food may be kept from alteration by a small quantity of a substance not only harmless to the organism, but even favorable to the economy.

If given internally, the flow of saliva is increased, and it remains more alkaline for some time; and there is an alkaline taste in the mouth. Doses of 3.5 seemed to increase the appetite. In dogs, where 1.25 of the borate of soda was given by intravenous injection every half-hour till 5. were taken, a decided increase was noted in the flow of saliva, which contained the salt ingested. It is present also in the urine.

Treatment of Bronchiectasis. — Seifert has practised intrathoracic injections of 2 cc. of a three-per-cent solution of carbolic acid, in two patients with bronchiectasis.

In the first case, inhalations of turpentine, perchloride of iron, tannin, and carbolic acid, proved impotent; but, after each injection through the intercostal spaces, the expectoration was diminished, and lost completely its fetidity.

The second patient died, and the *sequelæ* of this medication were sought on autopsy.

¹ Abstract of paper read before the Soc. de Thérap., Jan. 24, 1883. *Bull. et Mém. de la Soc. de Thérap.*, Feb. 15, 1883.

At the point of the last injection, made two days before death, there was a hemorrhagic infiltration on the pulmonary pleura. Three earlier injections left no trace, except a little pleural pigmentation at the point of puncture. No signs of inflammation were apparent about the course of the puncture through the pulmonary tissue, to the enlarged bronchi.

The injections are not painful, seldom provoke a cough, and determine no elevation of temperature. (*Beitrag zur Behandlung der Bronchiectasien. Otto Seifert. Berlin. klin. Woch.*, No. 24, June 11, 1883; *Rev. des. Sci. Méd.*, October, 1883.)

Caffeine in Diseases of the Heart. Huchard. (*L'Union Méd.*, Sept. 16, 1882; *Rev. des Sci. Méd.*, April, 1883.)

Huchard thinks:—

(1) That in certain cases caffeine is superior to digitalis. It is more rapid in its action, and diuresis is nearly always produced in twelve to twenty-four hours.

(2) While the caffeine diuresis comes on rapidly, it is not as profuse as that from digitalis, and the urine does not exceed 3–4 litres a day.

(3) Caffeine is innocuous in its action and rapid elimination. One need not fear accumulative or toxic effects, or gastric irritation, even when the liver is altered.

(4) Where digitalis is powerless or harmful, from fatty degeneration of the muscular fibres, caffeine succeeds, and is safe.

(5) It has no diuretic power in affections of the liver or kidneys.

(3) The commencing dose should be .25–.50, progressively increased to doses of .75–3., three or four times a day.

Caffeine in its Relation to Animal Heat.—W. Bevan Lewis has studied, using a calorimeter, the effect of caffeine upon heat production and retention. He concludes, that, whilst both caffeine and alcohol alike increase to a great extent the normal heat formation, they have a very important difference in that *alcohol, by an excessive and prolonged discharge of heat, greatly lowers the body temperature*; whilst,

on the other hand, *caffeine tends rapidly to re-instate the norma of temperature by retention.*

Whenever the slightest interference with respiration takes place in an animal whose temperature is reduced by alcohol, the heat-production ceases, and the temperature may fall to the lethal point.

Where caffeine and alcohol are given together, an early stage of diminished heat-formation precedes the increased heat-formation, and the fall of temperature produced by alcohol is more or less *completely antagonized by the caffeine.*

In all cases, caffeine contracted the pupil, augmented the flow of saliva and intestinal mucus, disturbed the vaso-motor condition of the ears, and occasionally caused cerebral excitement. (*Four. of Ment. Sci.*, July, 1883.)

Poisoning by Citrate of Caffeine.—Routh reported to the Medical Society of London a case in which he ordered the effervescent citrate three times a day, in 4 doses. The pure drug was sent instead. Fifty minutes after taking the first powder, there was a burning sensation in the throat, giddiness, vomiting, purging, and abdominal pain. Paralysis and tremors followed. The intellect was clear. An hour later, collapsed; pulse, 120. Vomited. Was given ammonia, alcohol, and nitro-glycerine. Did not rally for nine hours. (*Practitioner*, July, 1883.)

Calabar Bean.—Maschka has tried the extract of the bean as a remedy in diarrhoea, and finds it more efficacious than opium in a third of the cases of acute intestinal catarrh. It proved equally useful in nervous diarrhoeas; and its administration seemed indicated in children, where opiates are dangerous. Ten or twelve drops, many times a day, are given. (*Ueber die Wirkung von Extractum Fabæ Calabaris. Berlin. klin. Woch.*, No. 15, p. 227, April 9, 1883; *Rev. des Sci. Méd.*, October, 1883.)

Treatment of Croup by Sulphide of Calcium.—In a communication read before the Medical Society of Rheims (*Union Médicale du Nord-Est*, Aug. 15, 1883), Meunier reported upon a number of cases of croup treated by sul-

phide of calcium in doses of three to four and one-half grains *per diem*. The remedy was given in granules of one-tenth of a grain each, one or two granules every hour. The author regards the sulphides as of great value in the treatment of diphtheria and croup, while not being, strictly speaking, antidotal to the specific poison of this disease. Their mode of elimination, in great part by the pulmonary mucous membrane, is a further recommendation for their use. Meunier's success in the cases recorded was not startling, yet was such as to warrant further trial of the sulphide of calcium in this disease. (*N. Y. Med. Record*, Oct. 6, 1883.)

Calomel and Micro-Organisms. — Vassilieff has published some interesting researches concerning the action of calomel on the contents of the intestines (*Zeitschr. für physiol. Chemie*). He alleges that he has proved that this drug leaves the gastric, hepatic, and pancreatic secretions absolutely unchanged; but it prevents certain processes of retrogressive metamorphosis and putrefaction, by destroying bacteria and micrococci naturally present in the alimentary canal. Hoppe-Seyler has rightly attributed the bright green color of calomel stools to the presence of unaltered bile in the fæces. Under normal conditions, the coloring matter of bile is destroyed in the process of digestion. But Vassilieff argues that calomel prevents this destruction, and the coloring material remains to give to the fæces their peculiar hue under these conditions. The pancreatic secretion is peculiarly complicated, and particularly liable to very rapid decomposition, with the consequent formation of indol and allied products. Calomel entirely prevents this change, and also alters the characters of the gases evolved in the process of pancreatic digestion, especially diminishing the evolution of carbonic acid. Experiments on artificial pancreatic digestion proved, that, when calomel was mixed with pancreatic juice, proteids, starch, and fats were all acted upon in the usual manner, trypsin, amylopsin, and steapsin being unaffected by the drug, but indol, long recognized as a product of decomposition, is not formed. Vassilieff, in a further series of experiments, found that this prevention of decom-

position was due to the distinctly aseptic and antiseptic properties with which calomel is endowed. He discovered that it prevented the formation of bacteria and micrococci in food removed from the intestines and freed from these micro-organisms, and that it also destroyed them where they were present. Vassilieff administered 1. of calomel to a dog, in two equal doses, and killed the animal a few hours after the second dose. The contents of the intestine were collected, and analyzed with every precaution. No indol or phenol could be found; but much leucin and tyrosin, generally destroyed at an early stage of digestion, were detected. This experiment appears to have been repeated more than once. Other experiments, with cheese, showed that calomel prevents butyric acid fermentation. (*N. Y. Med. Record*, Aug. 11, 1883.)

Carbamide in Intermittent Fever.—In the *Vrach. Vedomosty*, No. 564, p. 3920, there is an article narrating sixteen cases of intermittent fever treated by the administration of carbamide. It is given in from 1. to 2.4 doses, four or five hours before the usual time of the paroxysm.

Seven cases of quotidian and four of tertian fever were cured. In three quotidians and two quartans, the treatment failed. A single dose of 1. cured two patients, a dose of 1.20 cured two, and two doses of 1.20 cured four. No untoward symptoms followed its use, and relapses occurred as frequently as in cases treated with quinine. (*Lond. Med. Record*, Dec. 15, 1883.)

Carbolic Acid.—Williams, in the service of Dr. Costine, reports the following case of poisoning by carbolic acid.

When first seen, two or three hours after the ingestion of the acid, the patient was found completely anæsthetic. The muscles were relaxed, eyelids closed, pupils dilated and inactive, skin cold and clammy, with large drops of perspiration like beads running down the cheeks, temperature manifestly lowered, respiration feeble and shallow, the pulse at the wrist imperceptible, and the action of the heart feeble and intermittent.

Subcutaneous injections of ether, galvanism, etc., gradually brought her out from this extreme state of collapse.

There being no means of ascertaining what poison the patient had taken, .008 of apomorphia was given hypodermically. In fifteen minutes she expelled with a gush about 150 cc. of a dark-colored liquid, smelling strongly of carbolic acid. Olive-oil was then injected by the stomach-pump, and soon the oil and more of the dark fluid were vomited. The urine was dark brown, and responded to tests for carbolic acid. The fæces were also of a dark color. With the exception of some soreness of the mouth and throat, together with a little pain in the epigastrium, the patient recovered without a bad symptom. It was afterwards ascertained that 45 cc. of common crude carbolic acid had been swallowed. (*Lancet*, Aug. 18, 1883.)

Distension of the large Intestine with Carbonic Acid Gas. — Ziemssen employs this as a means of diagnosis and treatment. He introduces 20. of bicarbonate of soda and 18. of tartaric acid into the intestine through a tube. This suffices to make five litres of gas. This distension serves to indicate the form and position of the intestine. In a smaller amount it is useful to excite peristaltic action, and to relieve malposition and obstruction. It is more efficient and less harmful than fluids. Pain may follow its use, but inflammation never has. (*Wien. med. Blätter*, July 19, 1883; *Lond. Med. Record*, Oct. 15, 1883.)

Cellulose as a Dressing for Wounds.¹ (*Four. de Méd. de Paris*, Oct. 13, 1883, 444)

This substance is proposed by Fischer of Trieste. The cellulose is first soaked in water or a medicated solution, applied to the wound, and covered with some impermeable material. It is of special service in wounds which are inclined to heal under the influence of heat and moisture. Its advantages are stated to be: (1) that it is perfectly pure and aseptic; (2) that it is light, and does no harm by undue pressure; (3) that it encourages neither eczema nor ery-

¹ Abstracted by Dr. Charles H. Knight.

thema; (4) that it retains heat and moisture for at least twenty-four hours; (5) that it does not adhere to granulations; (6) that it may be perfectly moulded to any region; (7) that it is cheaper than any other wound-dressing material. (*Wien. med. Presse*, No. 16, 1883, 503.)

Chinolin. — Hofmann and Schoetensack say that chinolin when introduced into the circulation lowers the temperature;

That its antiseptic properties surpass those of salicylate of soda, carbolic and boric acid, and alcohol; for, in a two-per-cent solution, it prevents the decomposition of albuminous matters, the growth of bacteria in nutrient fluids, and lactic fermentation;

That, in a four-per-cent solution, it prevents putrefaction of the blood, and the separation of the caseine of milk;

That, in a one-per-cent solution, it keeps blood from coagulating, which quinine cannot do;

That it lowers the temperature at which albumen coagulates.

The tartrate of chinolin has no disagreeable taste, nor does it produce tinnitus aurium nor vertigo. For these reasons, it is nice to give to children. Its cost is only one-fifth that of quinine. (*Four. de Ph. d'Anvers* 1882; *Bull. Gén. de Thérap.*, Aug. 15, 1883.)

Chinolin in Diphtheria. — Seifert, in a series of cases of diphtheria, has lost but one since using chinolin. He uses a five-per-cent solution of pure chinolin, in equal parts of alcohol and water, as a local application, and a one-fifth-per-cent solution as a gargle. Each diphtheritic patch is painted with the stronger solution from one to four times a day, and a new brush is used for each spot painted.

The application is followed by a burning, smarting pain, which is soon removed by a little cold water. The fetor ceases, and the membranes come away, in slight cases, in twenty-four hours. (*Berlin. klin. Woch.*, No. 22, 1882; *Lancet*, Jan. 6, 1883.)

Chinolin Tartrate. — Isudeikin says chinolin tartrate acts as a poison to the central nervous system, especially to the

cord and medulla. The excito-motor centres of the heart are implicated. After the hypodermic injection of the tartrate, there ensues a paralysis of the extremities, a fall of temperature, some dyspnœa, and a slowing and weakening of the heart. After a period of from twelve to forty-eight hours, during which the animal appears to be in a perfectly normal state, a sudden weakness comes on, respiration and circulation become embarrassed, and the animal dies. (*Wratch*, 29, 103, 1882; *L'Union Méd.*, Oct. 4, 1883.)

Chlorinated Carbolic Acid.—Diani mixes carbolic acid with chloride of calcium, and obtains a mixture which has antiseptic properties twenty-five times as strong as carbolic acid alone.

It, in very small quantities, arrests all kinds of fermentation;

It surpasses, in its action, permanganate of potash, chloride of calcium, carbolic acid, thymol, salicylic and boric acid;

It destroys odors, as well as disinfects, and can be perfumed with oil of lavender;

Applied pure, it irritates the tissues, but is unirritating when applied in solution;

It is very useful in soft chancre, diphtheria, and other gangrenous affections;

Its preparation is so easy that any one can order it.

The salts that result from the combination of this mixture with bases are also antiseptic, and that with soda is odorless. (*St. Petersb. med. Woch.*; *Bull. Gén. de Thérap.*, June 15, 1883.)

Chloral in Strychnine Poisoning.—Faucon thus summarizes his experimental and clinical investigations into the antagonism between chloral and strychnia:—

1. Because of its power of retarding the symptoms of strychnine poisoning, coffee should be at once and repeatedly administered.

2. Notwithstanding the precipitates produced by tannin and iodine tend to dissolve, they should not be neglected; for, if they do not afford permanent relief, you gain precious time by their use.

3. Emetics, particularly ipecac and tartar emetic, should be given; but they are frequently without effect.

4. When, in spite of these means, toxic symptoms appear, chloral should be given.

5. Subcutaneous injections, one-third the dose by the mouth, should be given; and it should be administered by the mouth too.

6. In extreme cases, intravenous injection should be resorted to.

7. The quantity depends on the gravity of the symptoms.

8. When death is not lightning-like, the great quantity taken and the long duration of the symptoms should not preclude a favorable prognosis. (*Arch. Gén. de Méd.*, January and February, 1883.)

Chlorate of Potash. — Mering says: —

1. Chlorate traverses the system with hardly any change.

2. In a mixture of blood and chlorate of potash, it produces methemoglobine: at the same time, part of the chlorate of potash is reduced.

3. The addition of an alkaline base retards the decomposition of blood; the addition of carbonic acid hastens it.

4. The chlorate of potash decomposes venous, more rapidly than arterial, blood.

4. The deleterious effect of chlorate of potash is greatest when the salt is taken on an empty stomach, and when its elimination is impeded. (*Gaz. Méd. de Paris*, Nov. 17, 1883.)

Chloroform Internally Administered. — This anæsthetic has enjoyed some repute of late in France, as a remedy for the relief of pain when internally administered. It is prepared for this purpose in the following way: A flask is about three-fourths filled with distilled water, and an indefinite quantity of chloroform added. It is then thoroughly shaken at frequent intervals for about an hour, and then set aside. When the upper part of the mixture becomes perfectly clear, it is decanted from the cloudy deposit formed by the excess of chloroform at the bottom. This "water of chloroform" is of the strength of about nine parts per thousand. Diluted with an equal amount of distilled water, it has a most happy

effect in the pain or nausea attending the process of digestion in dilatation of the stomach. De Beurmann recommends it also in pain accompanying organic disease of the stomach, in nervous vomiting, and in the vomiting of pregnancy. It is of rather agreeable flavor, and may be advantageously employed in combination with orange-water as a vehicle for the solution of chloral and other hypnotics, and also of salicylate of soda. At ordinary temperatures it is a stable preparation, and uninfluenced by the action of light. (*La France Médicale*, Aug. 28, 1883; *N. Y. Med. Record*, Oct. 6, 1883.)

Chloroform-Water in Gastric Irritation.—Bianchi introduces a litre of chloroform-water (a weak alkaline solution containing 5.–10. of chloroform), and allows it to remain from a few seconds to a minute. It produces no systemic effects. He was led to use it because of its anti-zymotic properties. He found it of most avail in gastric cancer, catarrh, and chronic gastritis. (*Lo Sperimentale*, October, 1882; *Lond. Med. Record*, Jan. 15, 1883.)

Chromic Acid as an Application in Certain Affections of the Tongue.—Butlin has used a two-per-cent solution of chromic acid as a local application in many superficial affections of the tongue, with varying success. He finds it acts with marvellous rapidity in secondary syphilitic affections, ulcers, mucous tubercles, and condylomata. Most tertiary affections, gummata, extensive ulcers, and tubercular syphilides are not affected by it. Some cases of chronic superficial glossitis, where slight ulceration and renewed inflammation have occurred, improve quickly. An acute inflammation of great severity is made worse by it. (*Practitioner*, March, 1883.)

Cinchonidine Sulphate.—Douvreur finds the physiological effects of sulphate of cinchonidia are :—

1. That it is equally poisonous as sulphate of quinine.
2. It causes, in the higher animals, a species of intoxication, characterized by a marked weakness of the hind limbs.
3. Soon come repeated vomiting and salivation, the drug being found in the gastric mucus and submaxillary saliva.

4. The weakness increases, and is accompanied by tremors and convulsions.

5. Periods of extremely rapid and slow respiration alternate.

6. At the commencement of its action, the pulse is quickened, and arterial pressure is increased.

The pressure and pulse become about normal when the dose is increased; and, as the pulse slows, they become stronger. As with quinine, the pulse remains always regular. Toxic doses slow the heart, and lower the pressure.

7. Voluntary and reflex movements become gradually weaker, and are finally abolished at the same time as the respiratory movements.

8. The drug acts on the gray matter in the medulla, as well as on the brain.

9. Alcohol lessens its power to cause convulsions.

10. Its antipyretic power seems greater than that of quinine, and it is enhanced by the simultaneous giving of alcohol. In healthy animals it often lowers the temperature 2° C. (*Recherches Expérimentales sur l'Action physiologique du Sulfate de Cinchonidine. Thèse inaugurale de Paris, par M. Douvroleur. L'Union Méd., Sept. 15, 1883.*)

Codeine Phosphate. — This preparation is soluble in four parts of water, and is thus useful for hypodermic administration, while the other salts are not. It contains seventy per cent of codeine, is similar to morphia in its effect, but has less tendency to excite toxic action, and is more suitable for sensitive patients. (*Wien. med. Blätter, Aug. 16, 1883; Lond. Med. Record, Oct. 15, 1883.*)

The Use and Abuse of Coffee. — M. Guimaraes,¹ with M. Raposo, who has since died, has studied the effects of coffee on the functions of dogs, — their nutrition, alimentation, and urine. The animals were weighed each day. Food, fæces, and urine were also weighed. The animals were kept in good condition, isolated, given a certain diet, and allowed to eat at will.

¹ Thesis presented to the Faculty of Medicine of Rio de Janeiro, Sept. 27, 1882.

EXPERIMENT 22. — *Healthy adult Dog, fed on Beef supplied to him in Excess.*

FIRST PART. — *Preparation.*

Date.	Body-Weight, gr.	Meat consumed, gr.	Fæces, gr.	Urine, gr.
July 6	5,500	600	27	250
7	5,700	600	15	200
8	5,750	500	16	170
9	5,750	500	15	180
10	5,600	500	30	170
11	5,600	350	40	100

SECOND PART. — *The Animal receives 40. Infusion of Coffee at Noon, and the same Amount at 3.30 P.M.*

Date.	Body-Weight, gr.	Meat consumed, gr.	Fæces, gr.	Urine, gr.
July 12	5,500	210	30	100
13	5,600	500	15	200
14	5,750	610	42	175
15	5,950	800	25	135
16	5,800	735	20	225
17	5,725	865	50	260

No water was taken during this experiment. This experiment, which was only one of many, shows that there is an increase of body-weight and of the amount of food consumed during the administration of coffee.

In another experiment, a dog, deprived of food but allowed water, died of inanition in thirty-one days, losing on the average 15. per day for every kilo. of his weight.

Another dog, deprived of solid food, is given 100. of infusion of coffee daily, in two doses. Death took place in thirteen days, the animal losing 28. per kilo. in weight each day.

SECOND EXPERIMENT. — *Dog eating at Will, and receiving twice 200. of Coffee in strong Infusion. Before the Experiment, the Weight of the Animal was 7,500., rectal Temperature 39.5°, and the Pulse 120.*

Date.	Weight.	Pulse.	Rectal T.	State of Animal.
Aug. 9	7,300	148	40.5°	Sleepy.
10	7,200	160	41.0°	Persistent Diarrhoea.
11	7,000	160	40.6°	
12	6,900	140	41.0°	Extreme Torpor.
13	6,800	160	40.0°	Loss of Sensibility.
14	6,450	170	38.0°	

Death took place on the 14th, with general muscular tremors. Immediate autopsy. Lungs, anæmic; hemorrhagic plaques in the left ventricle; kidneys and spleen, anæmic; liver, pancreas, and intestines, much congested; brain and cord, anæmic.

As a result, this and three other analogous experiments show that dogs given toxic doses of coffee stop eating, emaciate enormously daily, die rapidly, and show hemorrhagic lesions of the heart and lungs, congestion, and fatty degeneration of the liver and intestine.

In moderate doses, it is found, coffee almost invariably accelerates the heart, raises the blood-pressure and the rectal temperature, and excites more or less the most important functions.

COLD.

Thermic Effects of Sea-baths. — Aubert has found that :

1. Short sea-baths cause no fall of central temperature, during the bath.
2. Other things being equal, the fall of central temperature is proportionate to the length of the bath.
3. The low temperature continues after the bath, and reaches a lower point than during the bath.

Baths of fifteen minutes cause no fall. Baths of from

sixteen to thirty minutes cause a fall, on the average, of .3°. Baths of from thirty-one to sixty minutes duration cause a fall of .6° C. (*De l'Influence des Bains de Mer sur la Temperature du Corps; par Aubert. Mémoires de la Société des Sciences Médicales de Lyon, t. xviii.; et Lyon Méd., March, 1883. Rev. des Sci. Méd., April, 1883.*)

Effects of Refrigeration.—Dumontpallier, as a result of many experiments and the treatment of many cases of typhoid fever, concludes that slow and progressive refrigeration does not produce visceral congestions, and does not aggravate those that already exist, but rather relieves them. (*L'Union Méd., Aug. 5, 1883.*)

Influence of Continuous Cold upon the Deeper Tissues.—Bayer formulates the following conclusions from an elaborate series of experiments made upon dogs: 1. Local abstraction of heat causes a cooling of the neighboring and underlying organs and tissues. 2. The lowering of the temperature of a part is less marked, the more distant it is from the cooled surface. 3. The heat-losing property of a given tissue is in inverse proportion to its vascularity. 4. The local cooling announces itself by a more speedy fall of the general temperature. As a practical application of his researches, he states that ice-water should not be used as a hæmostatic; since the contraction of the vessels depends upon a continuous application of a moderate degree of cold, rather than upon that of a very low degree. He does not, however, deny the efficacy of ice-applications in bruises and subcutaneous injuries; but he states that in these cases the deeper tissues do not attain the same degree of cold as when ice is applied directly to the bleeding vessels. They receive only the proper degree of continuous cold to insure the contraction of the blood-vessels. The value of local cold applications in inflammations is thus explained: The direct cooling of the tissues depresses their activity. The vessels being contracted, the migration of white corpuscles is restricted, the general temperature is lowered, and the heat centre is depressed by reflex influence. (*Zeitschr. für Heilkunde, Nov. 15, 1882; N. Y. Med. Record, March 10, 1883.*)

Painless Treatment of Condylomata. — Nussbaum recommends the treatment of small condylomatous patches on the penis, by daily washings with salt solution followed by the sprinkling over them of calomel-powder. Chemical change takes place, and corrosive sublimate is produced; the condylomata disappear, and no pain is felt. This method is not new, but has fallen into unmerited disuse. (*Münchener ärztl. Intelligenzbl.*, 1882; *Practitioner*, October, 1883.)

Convallaria Maialis. — Polk narrates the case of a young man who had had, at infrequent intervals, attacks of very rapid heart's action; during one attack, lasting three days, the pulse was 240, for about twenty hours.

One evening he was seized with one of his attacks, the pulse being 240: his extremities were cold; moist *râles* were present in both lungs, and he had the appearance of a person with acute general pulmonary congestion

He was given .60 of the fluid extract of convallaria hypodermically, and the dose was repeated in half an hour. Five or ten minutes after this, the pulse dropped to 120. The fall was sudden. This was about half-past eight in the evening. At four A.M., the symptoms began to return. The dose was repeated; and fifteen drops every two hours was taken till 5.30 P.M., when ten drops every three hours was ordered. The next morning the pulse was 90. (*Proc. of the Practitioners' Society of N. Y.*, Jan. 5, 1883; *N. Y. Med. Record*, Feb. 3, 1883.)

Stiller has tried convallaria in various kinds of heart-disease, with indifferent success, the patients ranging in age from eleven to seventy years. The drug was given in infusion (15.-30. to 500 cc.), a tablespoon every two hours. In seventeen cases, absolutely no results were obtained. In two cases, there was a slight increase in the amount of the urine, but no improvement in the other symptoms, and no diminution in the anasarca. In one case the œdema increased during the administration of the remedy. In one case of weak heart with general anasarca, a slight improvement was noticed after the convallaria had been taken for twelve days. The pulse was diminished in frequency, and strengthened;

the œdema of the scrotum, though not of other parts, subsided; and the patient expressed himself as feeling better.

Convallaria, given after digitalis had failed, in a case of mitral and aortic insufficiency, apparently relieved. The dyspnœa was lessened, and the excretion of urine increased; but there was no improvement in the irregular action of the heart, or in the dropsy. The author concludes that convallaria is far from being an efficient substitute for digitalis. (*Wien. med. Woch.*, Nov. 11 and 18, 1882; *N. Y. Med. Record*, Feb. 24, 1883.)

Taylor thus sums up the results of a pretty extensive trial of this drug in a variety of diseases, twenty cases in all:—

Of six renal cases, three improved decidedly; of the other three, one developed uræmic convulsions, and one had phthisis. Of five cases of cardiac disease, four improved very decidedly. One case of pneumonia did well; one, which was moribund when seen, died. Of five cases of typhoid-fever, one only survived. In two cases of bronchitis and emphysema, the results were doubtful. The writer states that all his cases were very severe, and he believes his results as good as digitalis would have given. (*The Results of Clinical Experiments at the Roosevelt Hospital, New York*; *N. Y. Med. Record*, Jan. 27, 1883, Feb. 3, 1883.)

Sulphate of Copper.—Bochefontaine finds:—

1. That a one-per-cent solution of sulphate of copper does not prevent the development of a certain number of fungi, but it arrests that of vibriones, and that the proliferation of the latter is prevented by a solution of one-tenth per cent.

2. That giving the copper salt simultaneously with hypodermic injections containing bacteria, does not prevent the rabbits from dying in from twenty-two to forty-six hours with microbes in the blood.

He concludes, that, if the sulphate of copper acts on the contagious element of cholera, it is not through the vibriones or microbes. (*Note sur quelques Expériences relatives à l'Action antiseptique des Sels de Cuivre*; *Gaz. hebdomadaire*, Sept. 21, 1883.)

Corrosive Sublimate in Diphtheria.—Kaulich has used corrosive sublimate internally and externally in the treatment of diphtheria. He treats exudations in the mouth, nose, and throat, by brushing with a 1 : 2,000 or 1 : 1,000 solution. In infants who have been tracheotomized, he sponges the trachea with the same solution. Four times a day, or every two hours, this process is repeated. He gives likewise inhalations of a weaker solution (1 : 200,000), lasting fifteen minutes, every hour or less often, according to the case. Internally he gives .01-.02 of sublimate a day in albuminized water, with cognac and sugar. He also uses hot local applications. (*Prag. med. Woch., et Bull. et Annales de la Soc. de Méd. de Gand*, September, 1883, p. 357; *Bull. Gén. de Thérap.*, April 15, 1883.)

Corrosive Sublimate in Puerperal Antisepsis.—Negri concludes :—

1. That the toxic effects of sublimate, properly used, are almost *nil*: once only has he seen a mercurial erythema.
2. A solution of 1 : 2,000 has sufficient antiseptic power to combat puerperal septicæmia.
3. This solution can be substituted for two-per-cent solution of carbolic acid.
4. It has no odor, and costs less than carbolic acid. (*Annali di Ostetricia*, p. 428, 1883; *Bull. Gén. de Thérap.*, Oct. 30, 1883.)

The Weak Points in a Lister Dressing, and the Advantages of Corrosive Sublimate as an Antiseptic. By Robert F. Weir, M.D.¹

It must be admitted by the most devoted of the advocates of Listerism, that the dressings applied with the strictest attention to all the details of this system, not infrequently fail in controlling the progress of putrefaction. This is the case, not only in a severely lacerated wound, but also at times in a comparatively simple one.

It is difficult in all cases to explain why this should be so. In many, no doubt, some error in the technique may have been committed by the surgeon himself: in certain other

¹ Read before the New-York Surgical Society, April 10, 1883.

cases, it must be assumed, either that the antiseptic itself — i.e., the carbolic acid — is at fault, or has been wrongly applied, or that the dressings are themselves imperfect in construction.

In connection with these two points, considerable vagueness has been encountered. According to Mr. Lister, who started with a solution of 1 part of the acid to 100 parts of water, the solutions to be employed now are, for the instruments, hands, etc., 1 part to 20; for the spray, 1 to 30; and for the sponges, etc., 1 to 40. Why should such diversity exist? What strength, in other words, is necessary to arrest or destroy bacteric life in a wound? Clinical experience has generally settled on the range of strength given by Lister, to wit, from two and one-half to five per cent of the acid; but the application of laboratory tests does not apparently accord with this conclusion. For instance, in an article by Delacroix¹ it is stated that ten per cent of carbolic acid is required to destroy bacteric life; and, in the very careful and much-to-be-admired investigations of Koch,² it is likewise recorded that one-per-cent solutions of carbolic acid are necessary for safe or sure disinfection, and that the anthrax spores were destroyed in a four-per-cent solution only after three days, and in a five-per-cent solution only after two days' immersion. These statements have been widely quoted, and have much embarrassed observers by their variance with clinical work; but on reference to the articles themselves, and particularly to that of Koch³ "On Disinfection," published in the "Reports of the Imperial Board of Health" for 1881, there will be found a reason for the discrepancy. It consists in this, that the experiments have properly been conducted upon the *spores* of the anthrax bacillus as being the most resistant to disinfectants of all such micro-organisms. These spores are much more difficult to affect than the bacilli themselves. To show the influence of weak solutions upon the bacilli themselves, a number of tests were applied by Koch, by soaking silk threads in the juice expressed from the

¹ *Archiv für experimentelle Pathologie*, Band xiii., Hefte 3, 4, 1881.

² Koch, p. 242.

³ *Mittheilungen aus dem kaiserlichen Gesundheitsamte*, Berlin, 1881.

spleen of a mouse affected with anthrax bacilli, and then wetting them with one, two, three, and five per cent solutions of carbolic acid, for periods varying from two, five, ten, fifteen, to twenty-five minutes: after these had been placed in a gelatine culture-glass, no signs of development occurred, showing that all life had been arrested. In the several preparations, however, of the same impregnated threads, which had not been dipped in the carbolic solutions, there were to be found, in the gelatine culture-glasses, marked development of bacilli and even of spores. Again, a one-per-cent solution of carbolic acid, with an equal quantity of anthrax blood, injected into a second animal, proved innocuous; but a one-half-per-cent solution failed to neutralize the poisonous blood. Similar observations were carried on in respect to less obdurate micro-organisms, including the micrococci found in septicæmia; and, from a large experience gathered in this manner, Koch formulates the statement, that carbolic acid, in one to five per cent watery solution, is a good disinfectant for those organisms which have not passed into the *Danerform*, or the condition of spore growth; and that 1 part to 400 of water, i. e., one-fourth per cent, must be *permanently* present to control life in the bacteria met with in wounds. Note carefully here the use of the words "permanently present;" and it must also be remembered, that, to produce this condition, stronger solutions are of necessity to be employed.

More recently these experiments have been repeated, with a corresponding result, by Dr. Sternberg, of the United-States army; who has found, by the test of flask culture in reference to carbolic acid, that a 0.2 per cent solution of this acid would so act on septic micrococci as to prevent development, but that a stronger solution was required for the micrococcus of ordinary pus. This observer, reiterating the remarks of Koch, that the resisting power of reproductive spores is far greater than that of bacterial organisms in active growth (multiplication by fission), says that the quantity of carbolic acid to be used as a germicide shall not be less than five per cent; for it is necessary, he states, to keep on the safe side, since we do not know whether all of the pathogenetic bacteria form spores, or otherwise.

These considerations, which might be extended by debating more at length the steps of the various experiments, or by quotations from the observers, are sufficient to explain the satisfactory results that follow the present use of carbolic acid in the treatment of wounds, and to show us that the antiseptic has, in the main, hitherto been rightly used. In looking farther for causes of error, some may perhaps be found in the imperfection of the dressings. Tests of the strength of the gauze employed revealed to me in January, 1880, that the strength of this part of the dressing varied much with its age. Gauze impregnated after Lister's formula, and kept in a tight box, wrapped up in rubber cloth, gave, at the end of three months, 1.44 per cent of carbolic acid; and another specimen, similarly prepared and preserved, showed, at the end of three weeks, 1.82 per cent. These observations have been confirmed by Kopff, who found, on the second day after gauze had been impregnated according to Lister's and Brun's method, that the former contained 2.61 per cent, and the latter 5.62 per cent. In the gauze sold in the shops, only one-half per cent of carbolic acid was found. The gauze, when used, therefore, should be freshly prepared, for which purpose Brun's formula is the best :—

B. Resin	400 grams.
Carbolic acid	100 "
Castor oil	80 "
Alcohol	2 litres.

Another possible cause of failure in an antiseptic dressing is encountered in the catgut ligature. Made, as it is, from the intestine of a sheep, it is not to be wondered at that the possibility of infection thereby should have been considered. Few, however, have been the facts that confirm such a suspicion. Koch calls attention to this; and De Lauti¹ more recently repeats this caution, and quotes Zweifel of Erlangen, who accused the catgut of being a cause of infection in wounds. Kocher of Berne also furnishes a case where apparently the septicæmia was due to this cause; and Volk-

¹ *Arch. Gén. de Médecine*, March, 1883: *Les Devises Evolutions des Inements Antiseptiques*.

mann reports two cases of malignant pustule from the inoculation by means of anthracized catgut.¹ In investigating this point, Koch has found, by careful experiment, that solutions of carbolic acid in oil or alcohol are absolutely inert in respect to their action on bacteric life, either on the spores or bacilli. He took solutions of one and five per cent of carbolic acid in oil, and also pure oil itself, and tested them with the anthrax bacilli and other micro-organisms, and found that bacteric life was arrested in the pure oil at the end of six days. The same took place in each of the carbolized solutions. The same, moreover, occurred in the several experiments where the bacilli were exposed to the air on gelatine. In other words, no influence was exerted by carbolic acid when mixed with oil. The bacilli lived as long in oil and oily solutions as in the condition of culture. When the *spores*, however, of the anthrax bacilli, were introduced in the carbolized-oil solutions, reproduction could be accomplished after three months' immersion. The same results were met with in oily solutions of thymol and salicylic acid.

In explanation of the antiseptic action of carbolized oil as a wound-dressing, Koch, however, remarks that, "When it comes in contact with substances containing water, as, for instance, the tissues of the human body, wounds, etc., then it undoubtedly gives up part of the acid to these; and in this way an antiseptic effect may be obtained. But this holds good only in cases where aqueous fluids come in contact with the oil. In all other instances where dry substances, such as silk, catgut, instruments, etc., are to be disinfected by carbolic oil, not the least antiseptic effect is to be expected, even upon the most vulnerable micro-organisms." These investigations, it may be added, have been fully confirmed by those of Wolfhügel and Knowe in the same volume of reports. Kocher of Berne (already quoted) also made sundry experiments bearing on this point. This surgeon placed ordinary catgut, with all the customary precautions, in sterilized fluids, which became turbid from bacteric development within twenty-four hours. He also found, that if the catgut were steeped for twenty-four hours in the oil of juniper, and

¹ *Deutsche Zeitschrift für pract. Med.*, No. 18, 1877.

kept in ninety-five per cent of alcohol, it would not develop bacteria in sterilized fluids.

I do not know of any experiments that will determine whether the chromic acid used to render the catgut ligature more durable makes them at the same time aseptic; but we have information relative to sulphurous acid, which will be somewhat startling to the surgeons in this city who have relied upon this gas as a proper disinfectant for their contaminated hospital-wards. Two investigators, Koch and Wolfhügel, pronounce decidedly against sulphurous acid in gas, and in watery solutions, as a disinfectant, i.e., as an arrester of bacteric life. Koch says no real value can be claimed for it, and in none of the experiments conducted with it did it succeed in destroying all the germs present. The reliability of the tests of Koch and his assistants should attract attention to this point; as not only is this agent largely employed here in hospitals, as above alluded to, but it is likewise recommended to the public by our health boards for disinfection after scarlatina, diphtheria, and other contagious diseases. I may remark, in passing from this portion of my subject, that the most reliable disinfectant for closed spaces was presented by bromine; and ranking a little lower was chlorine, the less expensive. Returning to the catgut, it must be admitted, that, while thus open to the suspicion of a septic agent, yet the daily experience of surgeons has taught that its principal defect was in its unsatisfactory solubility. Since the addition of chromic acid and sulphurous acid to it, its durability in the tissues has been too much increased; and though the latter acid has permitted the catgut to be kept in a dry state, and the oil thus avoided, yet I have found that it will not dissolve for twenty or thirty days, and that it often acts as a foreign body. Weakening both the acids has improved it somewhat, but my experience in this line has not been sufficient to speak yet with positiveness.

The probing of scientific research has in this way revealed to us some of the weak points of the carbolic dressing; but notwithstanding this and the earlier condemnation of the spray by Trendelenburg, Brun, Mickulicz, Wernich, Duncan, and others, — a verdict which is, however, not accepted by

Lister, Nussbaum, Rydygier, Shiene, and their followers, — Lister's dressing has remained until very recently the best for surgeons to employ, though other antiseptics, and notably iodoform, have given very satisfactory results in other hands. The volatility of the former antiseptic, and the toxic properties of both those named, were decided disadvantages. Very lately an old remedy has appeared in this rôle of an antiseptic. This is the corrosive sublimate, or the old bichloride of mercury, — the mercuric bichloride of the newer nomenclature.

My first experience with this salt as a wound-dressing was obtained after reading an excerpt from the article of Delacroix, in which it was stated that corrosive sublimate, in the proportion of 1 part to 2,525 parts of water, was an effective germicide, — being 250 times more powerful than phenol or carbolic acid. With this imperfect datum, I used it in the spring of 1882, in 1 part to 2,000 of water, as a dressing to three compound fractures of the thigh and six of the leg, with very satisfactory results, — so much so, that, when I resumed my service in the New-York Hospital, in November last, the dressings were continued, but with some slight modifications: these were, first, that it was found that the strength was insufficient, — active bacteric life being at times found under the dressing, — and also from the fact that a perusal of the large experience of Kümmel and Schede of Hamburg showed that a stronger solution was required, and that it was free from the risk of toxic effects. For, of over two hundred cases presented by Kümmel, in only two were there any constitutional symptoms observed, and then only as a slight salivation. This surgeon says of the sublimate dressing, that the healing of wounds is accomplished with a certainty and uniformity unknown under the strictest Lister dressing; and in 212 extensive wounds, as recently treated by the sublimate solutions and peat dressings by Esmarch and Neuber, who recommend it strongly, there was no poisoning, and only three deaths. In this number were thirty major amputations, thirty-two resections and osteotomies, five herniotomies, fourteen cases of nerve-stretching, etc.; and in only eleven cases was the dressing changed more than

once. Bergmann, whose experience with the remedy has also been large, also lauds it. My own observation of the efficacy of the sublimate dressing, after I had properly achieved the correct method of using it, is yet comparatively slight, embracing four cases of necrosis of the foot and tibia; one amputation at the hip-joint; one amputation of the thigh; one amputation at the knee; one amputation of the leg; one amputation of the breast; two removal of tumors; one fixation of a movable kidney; one extensive laceration of upper thigh, — died twelfth day, of septicæmia; one subdeltoid bursa; three compound fractures of leg: with recovery in all except the case above noted. In two of the compound fractures, an aseptic condition was not preserved: in one of these, the solution was too weak, — 1:2,000; in the other, a 1:400 peat dressing was used, although, by error, solutions of 1:100 were several times resorted to. No special local effects were produced, beyond, in one instance, slight pustulation of the adjacent skin: no constitutional effects were noticed in any case.

Let me hastily indicate the mode of employment of this dressing. Carbolic-acid solutions are used by Neuber, Kümmel, and Bergmann, for the spray and for the instruments, and sometimes for washing out the wound. The sponges and compresses are wet with a solution of the sublimate, .50 to 500. cc. (solution No. 1). Silk, if used for sutures, etc., is dipped for two hours in a 5. to 500. cc. solution, and then permanently kept in the 5. solution. Catgut, as used by Kümmel, is made by immersing it in a 5. to 500. cc. solution for twelve hours, and then it is wound on bobbins, and kept in an alcoholic solution of 1.20 to 500. cc. with 45. cc. of glycerine added.¹ The gauze is prepared by immersion in a solution of 1.20 to 500. cc. of alcohol, with 45. cc. of glycerine. Drainage is accomplished by rubber tubes, or by spun glass twisted or plaited. If sand is used as an absorbent, after being heated in a cru-

¹ This catgut dissolves too quickly in a wound. Some recently used proved more satisfactory where — after the corrosive impregnation had been secured — the gut was dipped for two hours in a 1:1,000 chromic acid, then dried, and kept.

cible it is mixed in the proportion of .5 kilo. to 4. of sublimate, dissolved in 75. cc. of sulphuric ether. The sublimated sand is put in thin cotton bags, of various sizes, from 12 to 40 cm. square, which have been frequently washed with green soap and soda, rinsed, and finally dipped in the .50 to 500. cc. solution. Peat, sawdust, and other absorbents are also employed,¹ according to the judgment of the surgeon. It has been found in my wards, that, while pure sawdust has absorbed readily, yet a disagreeable, sour odor was often noticed, even where the underlying wounds were doing perfectly well.

A few words more will end these necessarily incomplete remarks. The experiments of Koch evidently excited the surgeons of Hamburg, Würzburg, and Kiel, to the use of the mercuric chloride as a surgical dressing; and, as the results of this able investigation have not been very widely disseminated on this side of the Atlantic, I beg to summarize them here. After applying a number of tests similar to those employed in connection with a number of so-called antiseptics and disinfectants (a partial list of which is here appended — Table I.), he found that simply moistening the anthrax spores (the most resistant of all, it will be remembered) with a solution of 1 part of corrosive sublimate to 5,000 of water, destroyed them thoroughly and immediately; and the destruction would equally happen if they are immersed for a longer time in solutions as weak as 1 : 20,000. He then says that the sublimate is the only known disinfectant which succeeds by a single application of a few minims of a solution of sublimate of 1 part to 1,000 in destroying the most resistant micro-organisms. He also furnishes us with a test as to the strength required in a wound-dressing. There should be present in a dressing an excess of corrosive sublimate equal to 1 part to 5,000; this will be readily recognized by leaving a thin strip of polished copper for half an hour in the dressing; if the excess is present, an amalgam will show itself; this seldom occurs in a 1 : 10,000 solution.

¹ The absorbing power of turf is 80 parts water; sawdust, pine, 55 parts water; sawdust, cedar, 44 parts water; bran, 23 parts water; sand, 14 parts water.

Naturally, with so potent a bacteric arrester, the idea comes into birth: Cannot the internal administration of the remedy be utilized in germ-diseases? Koch's experiments on anthracized rabbits by injecting sublimate solutions, however, were negative. Sternberg, estimating the blood in an adult of one hundred and sixty pounds to be twenty pounds, ascertained that the quantity of corrosive sublimate required to affect this amount of blood would be three and a half grains; and believes, that, although one grain *per diem* is the maximum quantity which could be administered for several days, a cumulative effect might be produced by its use, sufficient to exert some restraining influence on the development of micro-organisms within the system.

The annexed tables, taken from Koch and Sternberg's papers, give an interesting *résumé* of the germicidal power of a number of agents, some of which have wrongly been relied upon:—

TABLE I. (FROM KOCH).¹

(= indicates life destroyed totally.)

Sublimate corrosive, one per cent, in water, destroyed all bacteric life in	<u>1</u> day.
Permanganate of potassium, five per cent, in water, destroyed all bacteric life in	<u>1</u> "
Permanganate of potassium, one per cent, in water, had no effect at end of	2 days.
Osmic acid, one per cent in water	1 day.
Turpentine, oil of	<u>5</u> days.
Chlorine water, freshly made	<u>1</u> day.
Bromine, two per cent	<u>1</u> "
Iodine water	<u>1</u> "
Chloride of lime	<u>5</u> days.
Chloride of iron	<u>6</u> "
Iodine in alcohol, one per cent, hindered growth only.	
Arsenic, one per cent	<u>10</u> "
Sulphurous acid water, very slightly efficacious.	
Sulphuric acid, one per cent, growth hindered in	10 "
Quinine, one per cent	<u>10</u> "
Boracic acid, five per cent, practically unreliable; spore growth only hindered in	6r "
Borax, five per cent, no effect at end of	15 "

¹ *Mittheilungen aus dem kaiserlichen Gesundheitsamte*, Berlin, 1881.

TABLE II. (FROM STERNBERG).¹

Germicide value of Mercuric bichloride	one part in 20,000
" " Potassium permanganate	" " 833
" " Iodine	" " 500
" " Creosote	" " 200
" " Sulphuric acid	" " 200
" " Carbolic acid	" " 100
" " Hydrochloric acid	" " 100
" " Zinci chloridi	" " 50
" " Tr. ferri chloridi	" " 25
" " Salicylic acid, <i>dissolved by sodium borate</i>	" " 25
" " Boracic acid	No value.
" " Sodium borate, <i>sat. sol.</i>	No value.
" " Sodium hyposulphite	No value.

(*Med. News*, May 5, 1883.)

A new Surgical Dressing, and the Use of Corrosive Sublimate in Surgery.² Kümmell. (*Centralbl. für Chir.*, No. 29, 1882.)

A solution of 1 : 1,000 has been used, with excellent results. Carbolic solutions are used for the spray and for instruments which are corroded by the sublimate. Sponges and compresses are kept in a one-tenth-per-cent solution. Silk is prepared by boiling for two hours in a one-per-cent solution. Catgut is placed for twelve hours in a one-per-cent watery solution, and afterwards rolled and kept in a one-fourth-per-cent alcoholic solution of the sublimate, containing ten per cent of glycerine. Cotton-wool and gauze are prepared for dressing by soaking in the following solution: sublimate, 10.; rectified spirit, 4,490.; glycerine, 500. The cotton is then wrung out, and dried in the open air or in a hot chamber. The gauze is wrung out, cut into strips, and kept in a tin box, ready for use. White quartz sand is roasted in a crucible, sifted, and mixed with a hundred grams of sublimate dissolved in ether, ten-per-cent solution. This is applied to wounds as an antiseptic powder, directly on the surface, or sprinkled over the glass-wool dressing. The glass wool or silk, plaited to the required thickness, is also used for drainage. It seems to have remarkable absorb-

¹ Amer. Jour. of the Med. Sciences, April, 1883.

² Abstracted by Dr. C. H. Knight.

ing power, and it is easily cleaned and disinfected. Bags of various sizes, filled with coal-ashes, are used for dressing wounds. The ashes are sifted, and mixed with a solution of sublimate 25., distilled water 4,475., glycerine 500., in the proportion of ten kilograms to one litre of the solution. Before the bags are filled with ashes, they are soaked in the same solution, and dried. These cushions are useful for absorbing discharges and for giving support. All these materials have the advantage of being cheap and easily obtained. The author seems to have had extraordinary results with their use, but he is particularly careful about the observance of all antiseptic details. The first dressing is left on, if possible, until the wound is healed; that is, from seven to ten days. If glass-drains have been used, they are then removed, and another dressing, the final one, is applied. Union by first intention is effected, even in capital operations.

Cotoine. — Albertoni has studied principally the influence cotoine has on putrefactive processes.

It succeeds, when there is no profound lesion of the intestine, in the simple enteritis of cachexia, anæmia, and malaria; also in phthisis, pellagra, and infantile diarrhœa.

The author recommends it in .15-.20 doses (much larger than generally given). He thinks it is not only antiseptic, but also an alterative of the epithelial surfaces, thus favoring absorption and nutrition. (*La Cotoina, Ann. Univ. di Med. e Chir.*, September, 1882; *Rev. des Sci. Méd.*, April, 1883.)

Cotoine and Paracotoine. — Albertoni concludes that these drugs cause an active dilatation of the abdominal vessels.

In the diarrhœa of the insane, where defective absorption plays a notable part, it is very efficacious. In simple, chronic intestinal catarrh, the diarrhœa of wasting, cachexia, pellagra, and phthisis, it also gives good results.

He recommends .15-.20 in a wafer or in mucilage, with or without bismuth. Cotoine has no influence on the peristaltic action of the bowels, nor has it any direct astringent effect. As an antiseptic and antimycotic, its action is weak.

It does not prevent the decomposition of urine.

Where the mucous membrane of the intestine is hyperæmic

already, or where there is ulceration, and in dysentery, cotoine is contra-indicated. (*Riv. de Chim., Med., e Farm.*, May and June, 1883; *Lond. Med. Record*, Oct. 15, 1883.)

Cotoine in Diarrhœa. — Albertoni says cotoine does not act as a direct astringent, nor does it check peristalsis, nor cause constipation in the healthy. It is antimycotic and antiseptic, and especially obnoxious to the micro-organisms accompanying diarrhœa.

It checks salivation, and the night sweats of phthisis.

It is especially useful in the diarrhœa of phthisis, of infants during dentition, and of pellagra. It is also useful in the diarrhœa occurring in insanity, anæmia, and malaria.

The dose is .15-.20 up to .60 a day. Best given in powder suspended in mucilage. (*Ann. Univ. di Med.*, September, 1883; *Lond. Med. Record*, Jan. 15, 1883.)

The Uses of Creosote. — According to Hager, pure creosote is pale yellowish, exudes an oily liquid, and is of specific gravity 1.06. Lighter creosotes are either impure, or not creosotes at all.

When true creosote (not carbolic acid) is given to consumptives and cases of chronic catarrh, he asserts their general nutrition improves, and they are freed from asthmatic symptoms. .02-.04 of the creosote is given in pill form, three times daily. (*Analyst*, No. 80, vol. vii.; *Practitioner*, June, 1883.)

Curare. — The symptoms of excitation appearing before the paralysis of curare are well known. Conty, noticing this, cut the crural and sciatic nerves, when the twitching disappeared in the corresponding member.

As a result of other experiments, he found that the muscular phenomena produced by curare were the result of its action on the medulla and cord, as are those of asphyxia and strychnine, with this difference: that the latter agents produce convulsions only so long as the cord is capable of reflexes, while the twitchings from curare disappear when the excito-motor power is diminished by nervous lesions or chloral.

In curare poisoning, the loss of excitability in motor nerves appears soon after the cessation of functional movements of members and respiration, and co-exists with a functional integrity of the nervous centres; while, in strychnine poisoning, the order is reversed, the cord and medulla losing at once their normal re-actions, while the motor nerves lose only slowly their properties. Both excite, and then paralyze, the nervous centres, as also the nerves of striated muscle. Strychnine alone profoundly alters the cord, while curare affects chiefly the peripheral apparatus. The toxic effects of one become for the other accessory and slow. (*Sur l'Action convulsivante du Curare*. CONTY. *Compt. rend. Acad. des Sciences*, Oct. 23, 1882. *Des Analogies et des Différences entre le Curare et la Strychnine*; note du même, *ibid.*, Nov. 13, 1882.)

Cyanides of Gold, Silver, and Platinum.—Galezowski, a year ago, reported that the hypodermic injection of the cyanide of mercury was followed by good results in the treatment of condylomatous iritis, optic neuritis, and atrophy and choroiditis when of a syphilitic origin. In many of these cases general inunctions and hypodermic injections of the albuminate or peptonate of mercury had no effect.

Carried to doses of .015 to .020, the cyanide almost invariably produced intractable diarrhœas. To avoid this, Dr. Galezowski sought to substitute some other cyanide.

With eleven cases of tabetic atrophy of the optic nerve, he used, at different times, hypodermic injections of either the cyanide of gold, silver, or platinum.

In three cases, he met with encouraging results, the atrophy apparently being arrested.

He well says, that, considering the rarity of an arrest of the disease, the success in his cases may very well be more than a coincidence. The cyanides he uses are the cyanide of gold and potassium, that of silver and potassium, and that of platinum and sodium, in solution in distilled water in the proportion of .20 to 10. cc.; thus making a drop represent about a milligram of the cyanide. (*Gaz. des Hôpitaux*, April 17, 1883.)

Prophylaxis and Treatment of Cystitis in Women.—Küstner considers that many cases of cystitis in the female are due to a transfer of septic material from the vulva into the urethra and bladder by means of the catheter, and recommends that catheterization should not be done by touch alone, but should be aided by the eye. Further, the vulva should always be carefully cleaned before catheterization. It is highly important to have a clean instrument, and he considers this impossible with the instrument generally used. Even when it is boiled in carbolized water, and cleaned with a brush, some material, more or less septic, will be found adhering to the eye, which cannot be reached by the brush, even when the catheter has a perforated extremity. He recommends a simple, straight glass tube, of the size of an ordinary catheter, with a bevelled opening for introduction into the bladder. Küstner says that the curve of the female catheter does not correspond to the normal course of the urethra, which has been found by vertical sections to be either straight or sometimes S-shaped, — never C-shaped, — and consequently a straight tube will answer perfectly well. These catheters have been in use in Küstner's clinic for a long time; and no case of vesical catarrh has occurred since they first began to be used, although some patients have been catheterized as many as forty times after severe operations. The bevelled edge of the catheter is ground very smooth, and of course a catheter with a chipped place in the end must be thrown aside.

Local treatment, washing out the bladder, is the best means of treating vesical catarrh. The ordinary instruments in use for this purpose, double-current catheters or T-tubes with India-rubber tubing, are insufficient for this purpose. Küstner uses a glass funnel-tube, somewhat like his catheter, into which a hollow stopper fits. When the bladder is full, the stopper is removed, and the urine escapes. For irrigation, he formerly employed weak carbolic solutions; but he now uses corrosive-sublimate solution, 1 : 5,000, giving not more than two irrigations in a day. By this means, severe cases of cystitis have been cured in two weeks. [It may be pertinent to inquire why the stopper should be hollow if it

must be removed when the urine is drawn.] (*Deut. med. Woch.*, May 16, 1883; *Med. News*, Aug. 18, 1883.)

Diabetes.—Masoin asserts that prolonged use of permanganate of potash causes a fatty degeneration of the liver; and that it is efficacious in the treatment of diabetes mellitus, when there is much portal congestion. (*Traitement du Diabète sucré par le Permanganate de Potasse*; *Rev. de Thérap.*, Jan. 15, 1883.)

Dietetic Treatment of Nutritive Disorders in Infants.—Biedert has treated a number of cases of infantile digestive disorders, without drugs, by means of a strict regulation of the diet. The diseases thus treated were dyspepsia and dyspeptic diarrhoea, chronic catarrh, extreme atrophy (*tabes mesenterica*), ulcerative enteritis, cholera infantum, and one case of supposed epidemic dysentery. The children were most carefully watched, and the greatest care observed in carrying out the minute details of treatment. From the results obtained, the author feels himself justified in recording the following deductions (*Centralbl. für klin. Med.*, June 16, 1883): 1. A surprisingly large number of gastro-enteric disorders in infants stand in such close relation with the quality and insufficient quantity of food, that the diseases, even in the most serious cases, may be cured solely by the administration of a suitable diet. 2. The quantity of food given is of the greatest moment. 3. The nourishment must often be given in greatly diluted form. 4. The proportion of albumen to fat plays an important rôle. The digestion of albumen is facilitated by mixing it with a much larger proportion of emulsified fat than is found in cow's milk,—that contained in human milk being the proper amount. 5. It should not be forgotten, that at times there is a diminished absorption of fat; in which case, it should be greatly reduced in amount, or, in order not to interfere with the digestion of albumen, slightly reduced to a proportion midway between that of human milk and cow's milk. (*N. Y. Med. Record*, Aug. 18, 1883.)

The Action of Digitaline.—Schmiedberg summarizes the effects of digitaline as consisting of four stages:—

1. Increase of the arterial blood-pressure, not necessarily accompanied by diminution of the pulse-rate ;
2. Continuation of the increased blood-pressure along with an abnormally rapid pulse-rate ;
3. Blood-pressure still high, but great irregularity of the heart's action, and an irregular pulse-rate ;
4. Rapid fall of the blood-pressure, sudden stoppage of the heart, and death of the animal.

The increased arterial blood-pressure is not dependent on contraction of the arterioles, but on the arteries being more strongly filled through an alteration of the activity of the heart. Exactly what this alteration is, the author does not state, except that digitaline appears to diminish the elasticity of the cardiac muscle. He evidently does not believe that digitaline directly stimulates the contractility of the muscle.

It is by raising arterial pressure, and consequently retarding the pulse, that digitalis is of service therapeutically. (*Archiv für exper. Patholog. und Pharmacolog.*, Band xxi., S. 149; *Lond. Med. Record*, January, 1883.)

Digitalis in Mental Diseases. — Ribas gives the following *résumé* of the indications and contra-indications for the use of digitalis in the treatment of mental maladies.

Digitalis is indicated : —

1. In acute mania from anæmia, where there is dilatation of the pupil, and feeble, rapid heart's action ;
2. In chronic tranquil mania, especially those cases having hallucinations of sight and hearing ;
3. In hypochondriacal mania, especially when there exists disease of the lungs, heart, or great vessels ;
4. In "*manie anxieuse* ;"
5. In suicidal melancholia ;
6. In hypochondriacal melancholia ;
7. In religious ecstasy ;
8. In the melancholic form of general paralysis, particularly if there be an anæmia or a suicidal or hypochondriacal tendency ;
9. In simple dementia.

Contra-indications to the use of digitalis are present :—

1. In acute delirium in general, and in restless, violent, or incoherent delirium ;
2. In chronic, following acute manias ;
3. In acute or chronic hallucinations, which coincide with other mental affections caused apparently by over-nutrition of the brain ;
4. In simple and chronic melancholia ;
5. In cataleptic ecstasy ;
6. In most forms of general paralysis. (*El Siglo Medico*, April 1, 1883 ; *Bull. Gén. de Thérap.*, June 15, 1883.)

Poisoning by an Infusion of Forty-five Grammes of the Leaves of Digitalis. Recovery.—Martin (*Le Courier Médical*) reports a case of this character to the Society of Medicine of Paris, in a man forty years of age. He remained, for twenty-two hours after taking the drug, without medical aid, and was under treatment for two weeks. The dose taken was equivalent to an infusion containing 0.040 of digitaline. The first symptoms were those of irritation of the stomach and intestine, but the symptoms produced by the action of digitalis upon the nervous system did not appear for forty-eight hours. The pulse-rate was reduced in the first twenty-four hours to 25 per minute ; second day, 29 to 35 ; third day, 40,—remaining about this rate for several successive days ; but when the patient was discharged, at the end of the two weeks, his pulse-rate was only 48. Dysuria was marked from the first, the patient urinating three or four times an hour, and only a few drops at a time for the first twenty-four hours ; later, the secretion was more abundant, but the dysuria continued for a week. Marked aphasia was present from the fourth to the eighth day, when it disappeared. On and after the second day, severe cephalalgia set in, which persisted for eight days. The affection of vision was marked and peculiar : there was,—

1. A diminution in visual power for near or distant objects, as shown in the want of ability to read a newspaper, except its title, and the inability to read a sign 30 centimetres high, at a distance of 50 metres ;

2. A modification in the vision of colors : the patient saw every thing *green*

3. A vacillation of small objects : the letters oscillated.

4. A certain deformation of objects, and particularly their inclination to the left to about 45° . The letters on the signs were bent to the left, and the windows, equally bent, seemed lozenge-shaped.

The visual disturbance continued for fifteen days. Before and after the poisoning, the vision was normal ; and the ophthalmoscope failed to detect any lesion on the twenty-fourth day. (*Four. Am. Med. Asso.*, Dec. 8, 1883.)

Diphtheria.—Bosisio recommends as curative treatment of diphtheria: Wash the throat well with a solution of chlorate of potash, then blow on the ulcers a mixture of the black sulphide of mercury and salicylic acid. Give .10 of the same mixture twice a day internally, and at the same time combat the fever with quinine and salicylic acid.

The preventive treatment consists in giving the black sulphide of mercury alone in .18 doses twice a day. (*Raccogli-tore Medico*, Nos. 9, 10, 1883 ; *Bull. Gén. de Thérap.*, June 15, 1883.)

The Advantages of a Dry Local Treatment in Otorrhœal Diseases.—One of the greatest hinderances to cure in an ear-disease accompanied by otorrhœa, whether the disease be due to inflammation in the auditory canal or middle ear, is the presence of granulations and polypoid growths. Yet one of the oldest forms of treatment of otorrhœal disease has been by copious syringing and instillation of various fluid medicines. Hence, in such treatment of this class of aural diseases, moisture has been repeatedly applied to and kept in the ear, a naturally heated locality. Now, as heat and moisture tend to promote granulations, and keep up a discharge, it is very apparent that a moist treatment of otorrhœa in many instances has a tendency to keep up, rather than to check, the morbid discharge from the ear.

On these grounds, therefore, Burnett, in a paper with the above title, in *The American Journal of the Medical Sciences* for January, 1883, holds that the syringe and all

forms of drops should be omitted from the home treatment by the patient in cases of otorrhœa. The most the patient should be directed to do is to dry his ear according to its need, by running into the canal and down to the fundus a twisted pencil of absorbent cotton. The surgeon is to use the syringe only when it is absolutely necessary to remove by it the matter from the ear, and thus prepare the organ for the application of medication by his hand. This latter part of the treatment should consist in the blowing of powders into the ear. Of these, Burnett recommends one prepared by triturating equal parts of tincture of calendula officinalis with boracic acid (equal parts), allowing evaporation, then rubbing one part of the thus calendulated boracic acid with one or two parts of pure boracic acid. Alum should not be used, on account of its tendency to produce furuncles. Comparative tables are given, which show that by the dry method of treatment the average duration of treatment may be shortened from two hundred and twelve days under the old plan to thirty-four days by the dry method.

Eczema of the Face.—Galezowski states, that, among the complications of phlyctenular keratitis, there are often found eczematous or impetiginous eruptions upon the nose and eyelids. He powders the part with calomel, and applies the following ointment:—

Oil of cade	. . . . .	.25
Red precipitate	. . . . .	.10
Camphor	. . . . .	.25
Vaseline	. . . . .	10.

When scabs form, he removes them, applies mitigated silver nitrate, and neutralizes with salt. (*Prog. Méd.*, July 21, 1883.)

Effect of Electricity on the Spinal Cord.—Löwenfeld finds that in animals an ascending current heightens the spinal reflexes, while a descending current lowers without abolishing them. In man, no effect is seen unless excessively strong currents are used, or the excitability of the cord is increased.

On animals, an ascending current produced some arterial dilatation. (*Untersuchungen zur Elektrotherapei des Rückenmarks*, Munich, 1883; *Rev. de Méd.*, Nov. 10, 1883.)

The Action of the Constant Current in Electricity applied to the Brain especially as concerns the Eye.—Gillet de Grandmont in the *Recueil d'Ophthalmologie* (August), after a series of experimental researches, reviews this subject at considerable length. In using this means for the relief of eye-affections, he places the negative pole on the forehead near the termination of one of the branches of the tri-facial nerve, while the positive pole is placed near the superior cervical ganglion of the sympathetic. The impression produced shows itself in various ways,—viz., by flashes of light which are indicative of an irritation of the optic nerve and a corresponding disturbance of the retinal elements,—and serves as a means of diagnosis to determine the degree of alteration of the retina. When, for example, an amaurotic does not see the brilliant blue light, but a feeble yellow glimmer, the prognosis would be far from favorable. The metallic taste in the mouth is not so easy of explanation: it has been supposed to be the result of a dialytic action upon the saliva; the iron taste has been supposed to be due to the decomposition of the elements of the blood containing iron, but this does not explain the copper taste. It is evidently due to a direct excitation of the lingual and glosso-pharyngeal nerves. The buzzing is due to an excitation of the auditory nerve. The dizziness is the result of a congestion of the encephalic centres. This appears only when the current is very strong, or when it is prolonged, and is very objectionable. Another objection to these strong and prolonged currents is the cicatrices which result on the forehead and neck from the destruction of tissue. The lowering of temperature which is shown on the use of a moderately strong current of electricity of short duration seems to negative the foregoing statement of congestion of the encephalic centres by a strong and long-continued current; but this is explained by the action on the sympathetic and consequently upon the vaso-motor nerves.

A current of feeble intensity stimulates the vaso-motors to the contraction of the vessels, and lowers the temperature. A current of greater intensity, or long continued, exhausts and overcomes the excitability of the vaso-motors ; and there is a vascular relaxation which admits of turgidity and distension, congestion, and sometimes even rupture, of the vessels. An electrolysis also takes place in the aqueous humor, possibly also in the vitreous humor and in the crystalline lens, similar to that shown in the decomposition of water, when oxygen passes to the positive and hydrogen to the negative pole. This accounts for the direct diminution in amount of the aqueous humor, diminution in mass of the vitreous humor, and alterations in the crystalline lens ; the latter being deprived of a portion of its water, and showing a segmentation bordered by opaque lines.

The conclusions drawn are, in effect, that continuous currents applied to the more profound affections of the eye are of great use in therapeutics ; that they act upon the circulation of the ocular globe, and that they act powerfully upon the secretions of the humors of the eye. They are useful wherever it is desirable to influence the retino-choroid circulation, to stimulate the nervous excitability of the retina, or to modify the secretion of the vitreous body. That is to say, that atrophy of the optic nerve, glaucoma, and chronic irido-choroiditis can be so relieved. As regards the strength of the current, the greatest benefit was obtained from using 4, 6, or 8 Lechanché elements of medium size. Whenever a larger number of elements were employed, cerebral disturbance always followed, without a corresponding benefit in the affection itself. A descending electric current applied for from four to five minutes, once or twice a week, sufficed to give satisfactory relief. Strong or long-continued currents are useless and dangerous in producing indelible cicatrices and in producing congestions of the brain. Gillet de Grandmont has never been able to obtain any important modification by this means in a confirmed cataract. (*Four. Am. Med. Asso.*, November, 1883.)

The Exact Value of the Electrolytic Method. — Rock-

well says he long ago gave up the attempt to treat malignant tumors by electrolysis. In a case of epithelioma of the face, however, he had recently obtained an entire disappearance of the growth. In some cases of intramural fibroids, he had had remarkably good success. An illustrative case was cited. In erectile tumors, he had had his best results. One operation is generally sufficient.

The best method of procedure was to connect the needles with the positive pole, and place the negative pole outside. The resistance is greater, but this can be overcome by increasing the number of cells. Cystic tumors can be as successfully treated as the erectile, but practically the application is less often needed.

Dr. Rockwell's conclusions were:—

First, The success met with in the treatment of malignant tumors is generally but trivial. In epithelioma, however, when superficial and easily reached, success may be had.

Second, The electrolysis of *intramural* fibroids often reduces the size somewhat, and gives great relief.

Third, For erectile and small cystic tumors, electrolysis is a specific.

Fourth, Goitres, if small and soft, may be reduced in size, even by external applications. Even when hard, electrolysis may be beneficial, but the results are variable.

Fifth, Hairs can be permanently removed.

Sixth, In many cases of stricture, relief or cure can be obtained by electrolysis; but experience is not sufficient to speak of its value positively. (*N. Y. Med. Record*, Oct. 13, 1883.)

Enteric Fever.—As soon as a person develops symptoms of enteric fever, Wilson¹ recommends decubitus and fluid food in small amounts, and at intervals of two or three hours. At night he gives a .45-.60 dose of calomel. This dose is repeated every second evening until three, or

¹ Observations on the Management of Enteric Fever, according to a Plan based upon the so-called Specific Treatment: a paper read before the College of Physicians of Philadelphia, Jan. 3, 1883.

rarely four, doses have been given in the course of the first six or eight days.

It is given alone, or in connection with sodium bicarbonate. There is commonly a slight increase of diarrhœa, if it be present, without aggravation of other symptoms; and in some instances the tendency of the temperature at this time to steadily rise appears to be controlled. If no diarrhœa had been present, the calomel usually produces two or three large evacuations on the following day. If the case does not come under observation until after the tenth day, one only, or at most two, doses of calomel are given.

In only one case in sixteen, was there observed mercurial fetor, and slight swelling of the gums.

Excessive diarrhœa is controlled by opium.

The author lays down the invariable rule of maintaining a horizontal posture.

From the beginning of the attack, one, two, or three drops of the following mixture are regularly administered in a wineglassful of ice-water, after food every two or three hours, during the day and night:—

Carbolic acid	4. cc.
Tincture of iodine	8. cc.

Sponging with aromatic vinegar and tepid or cold water is advisable, because cleanly, grateful to the patient, and to a slight degree refrigerating. When the axillary temperature reaches 40°, quinine in 1.6 to 2. doses should be given on a falling temperature, and repeated in from forty-eight to seventy-two hours if necessary.

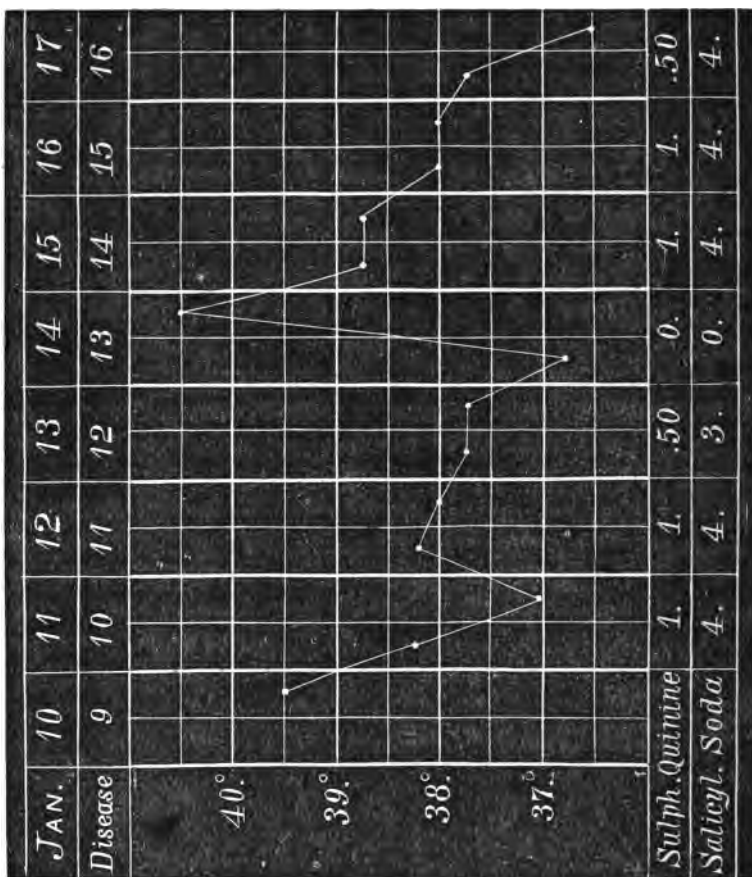
Alcohol is not recommended in the early part of the sickness, unless the patient be used to it.

The average duration of the disease was twenty-eight days. (*N. Y. Med. Four.*, March 17, 1883.)

Sorel has treated many cases of typhoid-fever by the simultaneous administration of quinine sulphate, and sodium salicylate, with apparently pretty uniform success.

To illustrate his method and its results, one of his temperature charts is subjoined. On the thirteenth day it will be

seen the medication was suspended, and a rise of over 3° C. took place.



In conclusion he says, that this treatment does not exclude other medication, is easily followed, prompt in its action, innocuous, exercising no bad effect on convalescence, and it has invariably an antipyretic action. (*Des Effets antithermiques du Sulfate de Quinine et du Salicylate de Soude administrés concurremment dans le Traitement de la Fièvre typhoïde. Par le docteur F. Sorel. L'Union Méd., Feb. 20, et seq., 1883.*)

On the Importance of the Thorough Disinfection of the Stools in Enteric Fever. — Wilson recommends a 1:500 solution of corrosive sublimate as a disinfectant for the stools of typhoid-fever.

The bed-pan should not be emptied for fifteen minutes. The solution should be freely used in the water-closet, some of it should remain in the bed-pan all the time, the linen should be sprinkled with it before being sent to the laundry, and portions stained with the discharges should be thoroughly wet with the solution. As a disinfectant it is cheap, efficacious, free from color and odor, sure and rapid. (*Am. Jour. Med. Sci.*, April, 1883.)

Treatment of Typhoid Fever. — Jaccoud divides the treatment of typhoid-fever into three main indications: —

1. To spare and sustain the vital forces. This he accomplishes by avoiding depleting and debilitating measures, and by diet, tonics, and stimulants (quinine, acetate of ammonia, and alcohol).

2. To combat the febrile temperature by cold lotions, hydro-bromate of quinia (1.-2.), salicylic acid (.50-2.); and

3. To relieve passive pulmonary congestion by the daily application of dry cups. (*Traitement de la Fièvre Typhoïde*, Paris, 1883; reviewed in *Prog. Méd.*, April 28, 1883.)

Ergot in Enteric Fever. — Duboué thinks enfeeblement of the muscular tissues is a prominent condition in typhoid-fever. This weakness, he thinks, progresses from the very first. The heart becomes enfeebled, and the blood-current retarded; congestion of vital organs, imperfect oxygenation of the blood, and defective nutritive power, ensue.

He explains the external or internal use of cold water, quinine, creosote, carbolic acid, the preparations of salicylic acid, ergot, etc., all of which act either directly or indirectly as excito-motors.

Duboué thinks ergot may cut short the fever in its prodromal stage. He insists upon its being of a good quality. Patients with typhoid-fever show a remarkable tolerance for the pure drug.

The mean dose has been from 1.5 to 3. daily for an adult.

It should be given until convalescence has been well established. (Paris, 1883; *Lond. Med. Record*, Oct. 15, 1883.)

Ergot in Typhoid Fever. — Lardier, after the narration of seventy-three cases of enteric fever treated with ergot, gives a summary of his conclusions.

He used almost entirely the powdered drug, and emphasizes the fact that there is very great variability in the activity of the drug. He gave from 1.5 to 2. a day.

Of his seventy-three cases, nine, or thirteen per cent, died. Of these nine, two were almost moribund when first seen; and one died from a bed-sore, dependent on age and a fractured thigh: thus bringing the mortality down to nine per cent.

He asserts that the medicine acts very rapidly, and improvement commences very quickly, — convalescence being fairly established in from ten to twelve days. Not a single case died of intestinal hemorrhage, and both it and epistaxis quickly yielded to the drug.

There is generally nausea and vomiting at the commencement of the treatment, but the third or fourth dose is generally retained. (*De l'Emploi de l'Ergot de Siègle ou de ses dérivés dans le Traitement de la Fièvre Typhoïde, et du Contrôle à exercer sur la Bonne Qualité de ce Médicament. Résumé de 73 Observations, par le docteur Lardier, chirurgien de l'Hôpital de Rambervillers [Vosges]. Gaz. hebdom. de Méd. et de Chir.*, No. 51, 1882, and Jan. 5, 1883.)

Iodide of Potassium in Enteric Fever. — Jélinski reports a series of twenty cases in which iodide of potassium was used as the chief remedy, and with very satisfactory results. From his observations it may be said, that, with the use of iodide of potassium, there is a regular duration of fourteen to sixteen days. This, says Jélinski, cannot be claimed for any other remedy. The slow though sure lowering of the temperature is not temporary, as with other remedies. There is a cessation, under the use of iodide of potassium, of the abdominal pain and diarrhœa. The period of convalescence seems to be shortened by the use of this remedy, and the disagreeable after-effects noticed with other

antipyretics do not occur. From these effects, Jélinski is inclined to regard it as a specific in typhoid. (*Berlin. klin. Woch.*, March 19, 1883; *Med. News*, May 12, 1883.)

Jélinski relates (*Berlin. klin. Woch.*, March 12, 1883) a series of twenty cases in which he has administered iodide of potassium as his chief remedy in the treatment of enteric fever, with satisfactory results, prefacing the record of cases with a brief historic notice. A summary of these observations affords the following conclusions: 1. Under the use of the iodide, there is a regular duration of from fourteen to sixteen days, which, the author observes, cannot be claimed for any other means. 2. The temperature and pulse are both slowly and surely lowered, not only for a short time as with many other antipyretics. 3. A prompt cessation of diarrhoea and abdominal pain. 4. The period of convalescence is shortened by the use of the iodide, and is not attended by the after-effects that often follow other antipyretic agents. The iodide, passing through the whole length of the intestine, affects its glandular structures, and there exerts its antiseptic and antiparasitic properties, so that the author regards it as a specific in the treatment of typhoid fever. (*N. Y. Med. Record*, June 2, 1883.)

Ergot.—Luton lets the alcohol evaporate from an alcoholic extract of ergot, and then uses it by means of deep hypodermic injections:—

1. In hemorrhages.
2. In passive retention of urine.
3. In varicose ulcers.
4. In certain forms of acute rheumatism where other remedies have failed.
5. In hæmophilia.
6. In certain forms of hydrocephalus. (*Soc. Méd. de Reims; Rev. de Thérap.*, Jan. 15, 1883.)

Ergot as an Adjuvant to Salicylic Acid and Quinine.—Schilling recommends the aqueous extract of ergot to be given with salicylic acid and quinine to lessen the tinnitus and deafness. It does not weaken their antipyretic powers.

It should be given in one-tenth the dose of the other drug. (*Allgem. Med. Central-Zeitung*, March 21, 1883; *Practitioner*, July, 1883.)

Ergotism. — Griasnoff of Poltava reported seventeen cases of ergotism, four of which proved fatal. The following were the almost constant symptoms: formication; agonizing pains and numbness in extremities, especially in the calves; sleeplessness; spasms; anorexia; headache, nausea, and vomiting; exhaustion and diarrhœa: weak and accelerated pulse.

In every case but one, gangrene developed; moist in eight, dry in seven. All had a high temperature, — 40° C. and more, — with evening exacerbations. The treatment consisted in amputation, faradization, fomentations with turpentine and camphorated oil, and the internal administration of quinine, carbolic acid, camphor, and wine.

The flour causing the poisoning contained but one per cent of ergot. (*Zdorouje*, March, 1882; *Lond. Med. Record*, March 15, 1882.)

Ergotism. — Tuczek, in watching fifteen cases of ergotism, found that all had spinal symptoms. In every case there was abolition of the patella tendon reflex. Besides this, there were paræsthesiæ, ataxia, and analgesia. These symptoms appeared in the period of marked cachexia several months after the acute intoxicant stage. In four cases a post-mortem revealed sclerosis of the external divisions of the posterior columns. (*Archiv für Psych.*, Band xiii., p. 99; *Brain*, January, 1883.)

Treatment of Erysipelas. — In four cases of erysipelas, Bogusch employed hypodermic injections of resorcine in a five-per-cent aqueous solution. The injections were made along the border of the erysipelatous part, at a distance of about three lines from each other, the point of the needle being directed toward the diseased spot. In each case, from thirty to seventy injections were made, and no other treatment was resorted to. The temperature fell rapidly, and the spread of the disease was arrested. Tusbin employed

hypodermics of bichlorhydrate of quinine in five cases of erysipelas. One or two injections sufficed. The reddened parts were painted with camphorated and carbolized oil. He never observed any ill effects to follow the injections, though others have reported numerous abscesses and indurations. This double salt of quinine, apart from its great solubility, is therapeutically in no way superior to the sulphate. (*Lyon Méd.*, June 17, 1883; *N. Y. Med. Record*, Aug. 18. 1882.)

On the Action of very Dilute Solutions of Eserine, and their Use in the Treatment of Weakness of the Ciliary Muscle. By John C. Uhthoff, M.D. Lond., F.R.C.S.

Solutions of the extract of Calabar bean, or of its active principle eserine, have for some years been used for the purpose of contracting the pupil or stimulating the ciliary muscle; but, as far as I can ascertain, these solutions have always been of a strength far greater than that of those, the use of which it is the object of this paper to advocate. Apparently, also, they have been recommended only in cases of decided paralysis of the pupil or the accommodation. Two important papers on the subject have been published. The first was read by Dr. Argyll Robertson before the Edinburgh Medico-Chirurgical Society, in February, 1863, when the use of solutions of the extract of Calabar bean was first recommended for cases of weakness or paralysis of the ciliary muscle. The second was by the late Mr. Soelberg Wells, in *The Medical Times and Gazette* for May 16, 1863, recounting the effect on the pupil and accommodation of a strong solution of the extract (one minim corresponding to 0.25 of the bean: I may here mention, that the yield of eserine is uncertain, so that the relative strength of it and the extract of the bean must be reckoned by the results of their application). Experiments were made upon Mr. Bowman, who graphically relates his own experience, and upon a patient with paralysis of the ciliary muscle and iris. Irregular and somewhat painful spasms of the muscle commenced after ten minutes, and continued for some hours, causing the nearer approach of both far and near points of vision.

In Mr. Bowman's case, the pupil remained fully contracted for eighteen hours, and did not return to its normal size for three days. Attempts to use the eye while the drug was in full action caused much distress and pain in the eyeball. Mr. Wells ends his paper with the following remarks: "My next experiment will be to test the curative influence of the Calabar bean upon paralysis of the pupil and accommodation; and to ascertain whether we cannot succeed, by periodic applications of a very weak solution of the bean, in exciting the sphincter pupillæ and ciliary muscle to gentle contraction, without fatiguing and weakening them by overstimulation." Accordingly, on reference to the last edition of his work on "Diseases of the Eye" (1873), I find that he relates his experience of the drug applied in cases of ciliary paralysis. But he seems to have used comparatively strong solutions; for he says that the drug should be applied of "a strength sufficient to cause considerable contraction of the pupil, and should be used at intervals of several days." Mr. Nettleship, in the appendix to his work on "Diseases of the Eye," lately published, mentions solutions of eserine of two strengths (one grain and four grains to the ounce), and remarks, "A very weak solution acts only on the pupil, not on the accommodation," — a statement which, I think, my further remarks will show to be generally incorrect. Cases of restored power after paralysis of the ciliary muscle, by the use of fairly strong solutions of eserine, are recorded by Mr. Hutchinson (*Med. Times and Gazette*, September, 1864), Mr. Wharton Jones (*Practitioner*, September, 1869), and Professor Gübler (*Med. Times and Gazette*, vol. i. 1874, p. 174).

I have made experiments on myself and others with solutions of eserine, of strengths varying from 0.0008 to .06 in 30 cc.; most of the trials being on my own eyes, which are, I believe, nearly normal in every respect.

I will now give the general results of a number of experiments carefully recorded at the time of observation. First, as to the effect on the ciliary muscle. It is a somewhat difficult matter to separate the result of increased power of accommodation from that produced by contraction of the

pupil, for either will cause a greater acuity of near vision. The following effect was interpreted to mean increased action of the ciliary muscle, independent of any contraction of the pupil. A varying time after applying the solution to one eye, which, for distinction, we may call the affected eye, small type viewed with both eyes became indistinct; this being evidently due to dimness of the affected eye. When the latter was closed, the print was clearly seen by the normal eye: when, on the other hand, this was closed, sight with the affected eye was at first dim; but on relaxing the accommodation, or bringing the type closer, vision again became clear. With the weaker solutions (.005 to .0008), this dimness was only noticed during near vision, letters at three metres being perfectly distinct; this, I think, indicating that the action of these weak solutions is to cause increased irritability, rather than a state of spasm of the ciliary muscle, so that the same effort of accommodation causes a stronger contraction in the affected eye than in the other: hence, while the normal eye is naturally accommodated correctly, the other is sighted for too near a point, and the type is therefore indistinct. From this mode of action arises their great value: they do not cause an artificial state of myopia, such as is produced by a .25 or even a .06 solution, but only a more ready re-action of the ciliary muscle to nerve-stimulus, — the very improvement that we desire when that muscle is deficient in tone. Now, in my own eyes, this peculiar action on accommodation was distinctly, though but slightly, evident after the use of the .0008 solution, as also was the case in two other persons experimented upon; while, in a third, neither this nor the .0016 solution had any effect. The accommodation commenced to be influenced from five minutes (.06) to twenty minutes (.0008) after instillation, and the effect lasted to a noticeable extent from two hours (.0008) to four hours (.06). The full action of the .06 solution was accompanied by the well-known pain of an overworked hypermetropic eye; but the use of the weaker solutions caused no pain or distress of any sort, another recommendation for their use in preference to those of greater strength. The pupil was in each case contracted

to a degree corresponding to the effect on the accommodation. The contraction always commenced very shortly after that of the ciliary muscle, but lasted for a much longer period, even for two or three days after the use of the stronger solutions. In the case of the .0008 solution, the effect on the accommodation was noticeable for at least five minutes before the pupil could be seen to be contracted, and ceased long before the latter returned to its natural size; clearly proving that the increased power of near vision was not alone due to the smaller size of the pupil.

All the solutions caused twitching of the palpebral portion of the orbicularis, — very slight with the weakest, considerable with the strongest. This commenced in from five to fifteen minutes after instillation, and continued for from fifteen to forty minutes. The twitching was increased by straining the accommodation to near vision. Thus, when testing the .06 solution, I found that reading caused the twitching to recommence, though it had completely ceased when the eyes were at rest; just as clinically we constantly meet with blinking in hypermetropic children who have strained their accommodation. Therefore this drug acts peculiarly on two muscles supplied by the third nerve, and also on a third supplied by the facial; and the action of the latter is increased by a nerve-stimulus (effort to accommodate) passing to one of the former. Again, the stimulus of increased light caused not only more contraction of the pupil, but also increased twitching of the eyelids of the affected eye; and I need hardly call attention to the irresistible contraction of these inner fibres of the orbicularis under a strong light. The associated action well known to exist between the palpebral portion of the orbicularis, and the ciliary muscle and pupil, is thus forcibly illustrated by the action of the eserine. The twitching of the eyelids always commenced a few minutes before the pupil or the accommodation were influenced, — a fact which may be accounted for by a more rapid absorption of the eserine through the conjunctiva than through the coats of the eye-ball; that is, supposing the drug to act directly on the muscular fibres, or on the nerve end-organs.

The therapeutic use of weak solutions of eserine was first pointed out to me by Mr. Bader, about a year ago; and since then I have made trial of them in a large number of cases of failure of accommodation, and with very considerable success. I generally order a .0016 solution to be used three times a day; and I warn the patient that he may experience some unpleasant twitching of the eyelids, and possibly a little dimness of sight, for a short time after applying the drops. In some cases, benefit has accrued at once, has continued so long as the drops have been used, and has lasted for a varying period after their discontinuance. In some, the improvement has passed off, and I have been obliged to increase the strength of the solution in order to continue the effect. In other cases, — and they have been few, — no benefit whatever has resulted.

I have found these solutions more especially beneficial in two classes of patients.

The first and chief class consists of cases of slight hypermetropia in young adults, where the error of refraction has caused no defect of vision until — through some failure of general health, or perhaps from overtaxing the eyes by an excess of near work — the power of accommodation has failed, and then there has arisen an array of troubles sufficiently well known; headache after near work, and inability to continue at it for any length of time, especially if by artificial light, being chief among the number. In such patients, the treatment is particularly valuable, and may keep the power of near vision at its normal standard, until, with rest and an improvement of the general health, the muscle recovers its normal power. As an example of this class I would mention the case of a young lady, who was sent to me suffering from all the troubles incident to the presence of an accommodating power insufficient to compensate for the slight amount of hypermetropia (1 D) which existed. Her sight had been good until a few months before coming to me, when she thought she strained her eyes by doing an unusual amount of near work by artificial light. Her far vision was good, and she could read D 0.5 Snellen for a short time with ease. The use of .0016 solution of eserine three times a

day caused immediate improvement; and at the end of a fortnight she wrote to me, saying that she was able to paint and read steadily and with comfort for a much longer period than she had been able to for six months before.

Secondly: patients with high myopia, even when fitted with suitable glasses, are sometimes unable to use them with any comfort for near vision; this being often, in great part, due to the feeble accommodating power such myopic eyes possess. These persons will speak gratefully of the benefit they derive from the use of weak solutions of eserine.

Considering how large a proportion of all the patients seen by ophthalmic surgeons are suffering from some error of refraction or accommodation, I feel that I need no apology for bringing before the profession this simple method of treatment. (*Br. Med. Jour.*, July 7, 1883.)

Paralysis from Ether.—Arnozan has found:—

1. That ether injected into muscles paralyzes them;
2. That this paralysis is analogous to peripheral paralysis, and is accompanied by loss of electric (*faradic*?) excitability, which returns slowly, as also does voluntary power.

While this paralysis recovers spontaneously, electrical treatment accelerates it. (*Four. de Méd. de Bordeaux*, June 25, 1882; *L'Union Méd.*, June 14, 1883.)

Bromide of Ethyl in Parturition.—Wiedmann concludes that the bromide of ethyl is a superior anæsthetic to use during labor.

It is a clear, volatile liquid, having a pleasant odor.

According to Lebert,¹ it relieves labor-pains, without danger to mother or child. It is more controllable and quicker than chloroform, and complete unconsciousness need not be induced. The patient can answer questions even while labor-pains are unperceived by her. The labor is not prolonged by the anæsthetic, nor is secondary hemorrhage apt to follow its use.

Rabuteau² says its action is not so prolonged as that of

¹ *Archives de Tocologie*, juin, 1883.

² *Compte rendu de Tocologie*, No. 26, 1883; *L'Union Méd.*, Dec. 13, 1883; *St. Petersb. med. Woch.*, 1883.

chloroform. The contra-indications of the two drugs are the same.

Eucalyptol.—Giron places eucalyptol among the best disinfectants. It is volatile, of an agreeable odor, non-caustic, and devoid of toxic properties. It is antiseptic in the proportion of 1 : 666, while carbolic acid is antiseptic in 1 : 200 solution only. It is stimulant and healing to wounds, does not destroy the tissues or sensibility, and does not corrode the instruments. The spray, the odor of which is agreeable, is not poisonous, and excites no cough. (*De l'Eucalyptol considéré principalement comme Antiseptique.* Par J. Giron. *Thèse de Montpellier*, No. 11, 1882.)

Gelatine in Dermal Therapeutics.—Unna and Beiersdorf recommend gelatine combined in various proportions with glycerine, giving it greater or less consistency, and with different drugs. It can be applied anywhere, adheres perfectly, protects the clothing, by its compression causes a slight anæmia, and is devoid of irritating qualities. (*Monatshefte für prakt. Dermat.*, Band ii., No. 2; abstracted in the *Prog. Méd.*, Sept. 1, 1883.)

Pick says: Put pure white gelatine with twice its weight of distilled water in a water-bath, and add the medicament you wish to use. Slight heat dissolves the gelatine, and when cold the mixture solidifies. When you wish to use the preparation, simply heat a portion, and apply with a brush. The addition of a small amount of glycerine makes the application more supple. The author finds this mode of applying drugs of great use in psoriasis. (*Monatshefte für prakt. Dermat.*, Band ii., No. 2; *Prog. Méd.*, Sept. 1, 1883.)

Gelsemium in Neuralgia.—Chéron has tried this drug with success in the submammary intercostal neuralgia occurring in women, often thought to be of an uterine origin. More or less success had followed his former treatment of this affection by quinine, aconitine, morphine, atropine, the bromides, etc.

The tincture of gelsemium, at first in five-drop doses, is increased up to eight drops three times a day.

The painful points he touched with compound tincture of iodine. (*Revue méd. chir. des Mal. des Femmes* ; *Prog. Méd.*, June 16, 1883.)

Glaucoma.—Pflüger formulates the treatment of glaucoma as follows :—

1. Every simple glaucoma should first be treated carefully with myotics.

2. In those cases with normal pupil and anterior chamber, without increase of the intra-ocular tension, in which, besides the functional disturbance, there exist only the pseudo-excavation and the atrophy of the optic nerve, as well as in the rare cases of sub-normal tension, he recommends small doses of eserine (one-fourth-per-cent solution), morning and evening, for months, and even years.

3. In glaucoma simplex, with increased tension, the myotic action of eserine and pilocarpine is all-important, unless the increase of tension is very marked.

4. If myotics fail to reduce the tension in simple glaucoma, he recommends iridectomy in preference to sclerotomy, as more lasting in its effects upon the tension.

5. Certain rare forms of acute glaucoma simplex should be treated with often-repeated instillations of a two-per-cent solution of pilocarpine ; as also that very rare form of glaucoma simplex with abnormally deep anterior chamber and increase of tension.

6. Traumatic cases are best treated with eserine, and, if this fails, then by iridectomy.

7. Acute and chronic inflammatory glaucoma is at first best treated with eserine, as preparatory to iridectomy.

8. Eserine is also to be recommended in absolute, or almost absolute, glaucoma with movable iris. In absolute glaucoma with wide, immovable pupil, and a narrow, atrophic edge of iris, adherent to the cornea, eserine may occasionally do good, but sometimes does positive harm. In the latter class of cases, sclerotomy is to be preferred to iridectomy.

9. In congenital hydrophthalmus, congenital glaucoma, and glaucoma with aphakia and irideremia, sclerotomy is to be preferred to iridectomy, preceded and followed by the use of eserine.

10. Secondary glaucoma demands, in the majority of cases, operative treatment; and here a broad iridectomy is the only sure means of relief. (*Ber. d. oph. Ges.*; *Beilageheft d. "Kl. mon. f. Aug."*, 1882; *N. Y. Med. Four.*, March 31, 1883.)

Glycerine in the Treatment of Acute Febrile Affections.—Semmola thought that glycerine might be used as a substitute for alcohol to ward off the adynamic symptoms of fevers.

He employs it, diluted with water and flavored with lemon, as a drink through the day. It is grateful to fever-patients, and quenches thirst. Given to the extent of 40.-50. cc. a day, it does not seem to disturb the stomach in the least.

He thinks it lowers the temperature, and diminishes the excretion of urea. (*Bull. Gén. de Thérap.*, June 15, 1883.)

The Influence of Therapeutic Doses of Glycerine upon the Excretion of Urea.—Catillon concludes that glycerine can be used internally without danger; is absorbed by the mucous membrane, which it excites enough to produce slight relaxation of the bowels; that it relieves the anorexia, diarrhoea, sweats, and insomnia of cachexia, and its use is followed by an increase in weight; the liver is enlarged, and the biliary flow is increased; it produces diuresis, and an absolute and relative increase of urea, chlorides, and phosphates. The urine is less alkaline, and if pus be present it is diminished. (*Bull. et Mém. de la Soc. de Thérap.*, Sept. 15, 1883.)

Treatment of Hæmophilia.—Dunn concludes that treatment of hæmophilia is unsatisfactory and unsuccessful. Among the more satisfactory means employed is cold, by means of a running stream of ice-water or by local application of ice if the bleeding is from cavities. Extensive sloughing may follow continuous use. The secondary effect of hot water might be tried. Judicious pressure is invaluable, though if excessive it will cause ecchymosis and sloughing. Nitrate of silver, alum, benzoic acid, the perchloride and persulphate of iron, and other hæmostatics are useless.

Styptics with moderate pressure have been advantageously employed: where these fail, the actual cautery may be used.

The most efficient internal remedies are ergot, opium, and gallic acid. Transfusion may be tried as a last resort.

As prophylactic means, the use of alcohol in the intervals between hemorrhages should be prohibited. A saline aperient may prevent an attack. The use of the perchloride of iron in the intermission perhaps renders the attacks milder and more controllable. Marriage of persons having or inheriting the disease is of course deplorable and unjustifiable. (*Hæmophilia*. By Thomas D. Dunn, M.D., West Chester, Penn. *Am. Jour. Med. Sci.*, January, 1883.)

Treatment of Diseases of the Heart.—See, in a recent work,¹ recommends the following treatment in cardiopathies:—

In cardiac dyspnœa he prescribes belladonna, datura, jusquiamine, which paralyze the nerves of the heart; anæsthetics and oxygen in inhalations, which cause congestion of the lungs; venesection, which weakens the heart. The application of sinapisms, cups, and blisters, is useless when not harmful.

He advises iodide of potash. With the iodide he also sometimes gives digitalis, convallaria, or chloral hydrate. For the paroxysms, he gives inhalations of the iodide of ethyl, injections of morphine, 2. extract of convallaria daily, dry cups, sometimes inhalations of chloroform.

In uremic dyspnœa, the preceding treatment cannot be counted on.

In the dyspnœa of hæmoptysis, he advises 4–5. of the aqueous extract of ergot in twenty-four hours, with .10–.15 of the extract of opium; simultaneously, turpentine in capsules, and perhaps digitalis, which by strengthening the heart prevents stasis of the blood.

In cardiac dropsies he gives diuretics (milk 3–4 litres, or convallaria) and non-emetic purgatives.

Opium and belladonna are proscribed, as they check intestinal and renal secretion.

¹ *Leçons de la Charité*; 2e. édition, revue et augmentée. Delahaye et Lecrosnier, 1883.

Diaphoretics (as jaborandi) can be given with milk and the drastics.

When the cardio-nephritic dropsy accompanies the uremic dyspnoea, he thinks the subcutaneous use of morphine dangerous. In such cases, iodide of potash should be added to milk diet and digitalis; and, if the dropsy persists, recourse should be had to scarifications.

Cardiac irregularity he treats by digitalis, convallaria, bromides, and chloral. In intermission he prohibits tea, coffee, alcohol, tobacco; and prefers convallaria to digitalis.

In palpitation from hypertrophy, he prefers iodide of potash; in anæmic palpitations from spermatorrhœa, he rejects iron, douches, bromides, and anti-spasmodics, and prescribes 1. iodide of potash twice a day, with meals; a pill of aqueous extract of ergot .15, alcoholic extract of digitalis .02, three times a day; a farinaceous diet, with fat meat and fish; astringent red wines; no mineral waters, beer, milk, coffee, nor tea; tepid baths every morning; intellectual work and moderate physical exercise; absolute continence in sexual matters.

In chlorosis, iron is generally successful, if aided by hydrotherapy and a hearty diet.

Hysterical palpitations he treats with digitalis, bromides, veratrine, and hydrotherapy.

General contra-indications to the treatment of diseases of the heart are hydrotherapy, mineral waters, ordinary and mineral baths, venesection, cauterization and blistering, iron and tonics (quinine).

General hygienic prescriptions are: A climate of medium and uniform temperature, rather moist, and with little wind. Mountain air suits some, sea air others; but more choose the temperate climate of valleys and plains, protected against winds. No severe or prolonged exercise (hunting, gymnastics, fencing), no climbing, no excessive study. The diet should be "anti-obésique" and nitrogenous, — soup, fresh vegetables, lean meat, cheese, fruit, milk, *eau rougie*, beer; coffee, if no palpitations are present; no heavy wines, liquor, white wine, tea, aerated and mineral waters.

Guard against gastro-intestinal dyspepsia and abdominal

plethora, which raises the arterial tension, and impedes the action of the heart.

Strive to preserve intestinal digestion, and the functions of the large bowel, by mild purges, repeated from time to time. (*Rev. de Thérap.*, Jan. 1, 1883.)

HEAT.

Warm Baths.—Grefberg has studied the influence of warm baths upon curarized dogs, noting their effect on blood pressure, and on the secretion of urine, a catheter being introduced into the ureters. Baths at 40° increased blood-pressure and urinary secretion. That the polyuria comes from the high blood-pressure, he proves by cutting the renal nerves, and still obtaining the same result. (*Der Einfluss des warmen Bades auf den Blutdruck und die Harnsecretion.* Von Wilhelm Grefberg. *Zeitschr. für klin. Med.*, Band v., S. 71, 1882; *Rev. des Sci. Méd.*, July, 1883.)

Helenol as a Surgical Dressing.¹ By M. Paul Blocq.

Helenol is one of the principles contained in the root of the alder, for a long time used therapeutically. The decoction of alder is vaunted as an anti-scorbutic by Knakstedt;² in the treatment of psoriasis, by Amatus Lusitanus,³ Hufeland,⁴ and more recently by Guibout. De Korab⁵ attributed to it eminently antiseptic properties.

Blocq, in the service of Gillette at l'Hôpital Tenon, has tried it as an antiseptic dressing in various cases, with good result.

He says its antiseptic power is like that of carbolic acid, but it has no toxic properties or bad smell. Its healing power is manifest. Slight erythematous eruptions sometimes follow its use, but it is devoid of caustic properties. It was employed by the author in a less than one-per-cent solution.

Cauterization of the Clitoris in Hysteria.—Professor Friedreich reports a case of paraplegia of a year and a half's

¹ *Prog. Méd.*, Nov. 13, 1883.

² *Bull. Soc. Philom.*, t. i.

³ *Op. Omn.*, p. 335.

⁴ *Man. Méd. Pr.*, 2e. ed., p. 437.

⁵ *Soc. Biol.*, 26 mai, 1882; et *Acad. des Sci.*, 4 juin, 1883.

standing, a case of aphonia of two years' standing, a glosso-plegia which had lasted four months, a tonic spasm of seven months' duration, and several cases of general severe convulsions, all of an hysterical nature, and all cured by *severe* cauterization of the clitoris with nitrate of silver. (*Virch. Archiv.*, p. 220, vol. 90; *Practitioner*, March, 1883.)

Have we any Therapeutic Means, as proven by Experiment, which directly affect the Local Processes of Inflammation?¹ By C. B. Nancrede, M.D.

Believing that the true aim of a paper read before this association should be merely the indication of the salient points of the subject, in order to elicit as full discussion as possible, I shall omit all such details as are non-essential. It will be impossible for me, in the time assigned, to answer the query forming the title of my paper, except with regard to the early stages of inflammation. Owing to press of work, I have also been unable to pursue my investigations as far as I had wished, and should therefore prefer to entitle my paper "A Preliminary Note as to whether we possess any Therapeutic Means, as proven by Experiment, which directly influence the Local Processes of Inflammation." I trust that any apparent neglect to specifically mention the sources of my knowledge will be set down to the necessary brevity of this paper, and to the fact that all of you must be more or less familiar with the sources whence my facts are culled.

Careful study of the essential processes of various morbid conditions has often led to the theoretical employment of therapeutic measures which by their apparent practical use have confidently encouraged their future employment. Clinical proofs, however, always embody the inherent weaknesses of careless or prejudiced observation, with the varying unknown quantity of the effects of the *vis medicatrix nature*.

But if, in addition, we find by experiment that our *a priori* therapeutics, when experimentally applied in the case of animals, actually produce the precise effects which we have pre-determined will probably prove efficacious, then we can

¹ Read before the American Surgical Association, Cincinnati, May 31, 1883. From the Medical News, June 16, 1883.

hardly go astray in confidently applying similar treatment to the human subject. If now we find clinical discrepancies, it must be our aim to ascertain the exact limitation of the remedy for good or evil, and the precise indications for its employment, instead of thrusting it contemptuously aside when we fail of the expected result; the failure being probably our faulty method of applying the treatment, and not self-inherent. Upon the other hand, we must always hold before our eyes the experimental mirror of what has been and can be effected, and not expect to do what we have demonstrated is an impossibility.

This paper is avowedly written in advocacy of bloodletting in general, but chiefly of the local abstraction of blood. This once much-vexed question seems again pressing for solution, as the pendulum of unreasoning prejudice and authority, having reached its farthest limit on the side of prescription, is now slowly swinging back to an opposite point, the stability of which must depend upon the possibility of satisfactorily answering the question contained in my title. If the answer be favorable, the revival of bloodletting will be founded upon the only sure basis, viz., that of demonstrated scientific facts, which will replace the purely theoretical dicta of authority, which, like the will-o'-the-wisp, led our forefathers into such an erratic use of the lancet that it wrought not only by its abuse its cure, but an almost total abolition of bloodletting, which I for one regret.

A rapid review of the minute processes of the earlier stages of inflammation, coupled with a consideration of some facts relating to the physiology of nutrition, will form a necessary preface to the body of my paper. I shall refer only to the early stages of inflammation; for, of course, no direct effect can be exerted upon the tissue changes of that process, when the inflamed part has returned to its foetal state, — is merely embryonal tissue, only a step farther from which is pus.

Examining with a low power, we find that the arteries are normally about one-sixth smaller than the veins, and that, "in every artery, a space can be distinguished within the outline of the vessel, which is entirely free from corpuscles." The arterial current is the more rapid, and it is appreciably

accelerated at each beat of the heart. Whether there is or is not a primary contraction of the arteries in the first stages of inflammation, seems to depend so much upon the irritant used, that I shall pass the question by as unimportant for our present purposes. The first change noted is an enlargement of the arteries, which become tortuous, the veins following suit; but there is "a time when, instead of the arteries being sensibly smaller" than the veins, "they far exceed them in diameter." Note this fact carefully. Contrary to expectation, at the outset the circulation is accelerated in the dilated vessels; but the rate soon becomes normal, and is succeeded by a slowing, then an oscillatory movement, a temporary stagnation; again a resumption of the flow; and finally permanent stasis, with crowding of the vessels—the veins especially—with cell-elements, so that the previous clear space existing along the walls of the arteries can no longer be detected.

The obstructions seem to consist solely of red cells, which are so closely packed as to render "their individual forms . . . scarcely distinguishable." Free diapedesis of the white blood-corpuscles now takes place, with exudation of liquor sanguinis; both processes having commenced when incipient stagnation set in. The experiments of Ryneck and H. Weber have demonstrated, "that, in an injured part, the walls of the capillaries become so altered that the liquor sanguinis, instead of transuding from the smaller arteries in quantities just sufficient to balance the absorption, leaks abundantly from the vessels, and that in many cases this is subsequently associated with squeezing out of the leucocytes or even of the colored corpuscles." The consequence of this free exudation is, that, owing to increased pabulum—liquor sanguinis—the cells of the inflamed area multiply, until, in many instances, we have the tissue reverting to the foetal state, when it consists merely of embryonal tissue,—viz., a mass of indifferent cells held together by a small quantity of intercellular cement, which latter has only to liquefy, and *pus* at once results.

The remaining subsidiary phenomena of inflammation, being non-essential, are purposely omitted.

To summarize the whole process in the words of Dr. Burdon-Sanderson, "the circulation is at first accelerated and increased, subsequently retarded and diminished;" and "the latter condition is attended with exudation of liquor sanguinis, migration of leucocytes, and stasis."

That the primary acceleration of the blood-stream is in some way dependent on reflex nerve action, seems clear. At this point, our researches into the essential phenomena of inflammation may cease. A few physiological facts demand consideration before I sum up what *a priori* reasoning indicates as to the therapeutics of the early stages of inflammation. Ranvier has shown, that the white blood-cell is sluggish, and then ceases to move, in the absence of oxygen, and is active in proportion to the amount of that substance present. It is also indisputable, that the red cells are the main carriers of oxygen; and that, if their numbers are increased relatively to the fluid in a given bulk of blood, — especially if, as in inflammation, both the necessity and capability of the cells of the tissue making use of the oxygen are removed, — at once an excess of oxygen obtains; i.e., an increased amoeboid action of the white cells not only is possible, but becomes a necessity. Physiology teaches us, that only so much of the constituents of the blood-plasma exude or are withdrawn by cell-action as suffice for the normal function of the parts; and that, if any excess is present, the lymph-spaces return it into the lymphatics, whence it passes into the general circulation. If, however, the lymph-spaces are compressed by dilated blood-vessels, and crowded with migrated cell-elements, the excess of pabulum must be retained, with a consequent stimulus to undue cell-proliferation. Precisely this obtains in inflammation. But physiology likewise shows us, that there is a certain attraction exerted upon the blood-current by the tissue-cells, according to their varying wants, which not only aids the *vis-a-tergo* action of the heart, but actually determines to a certain extent the amount of blood present at any given time, for instance, in a gland. If this action obtains in health, there is no reason to doubt it is still more potent in disease. From the physiological fact, upon the one side, that only so much pabulum is withdrawn as

suffices for healthy function, and, on the other, that in inflammation this material is in great excess, it seems proven, viewed from the light thrown upon the subject by the experiments of Ryneck and Weber, that in some way the capillary walls are injured by intra-vascular pressure.

To summarize: (1) Intra-vascular pressure injures the vessel-walls, aided perhaps by the constant passage of the white cells. In consequence, an inordinate amount of blood-plasma exudes, which stimulates cell-proliferation. (2) The accumulation and stagnation of the red blood-cells, with the draining-off of the liquor sanguinis, cause a relative excess of oxygen, which excites to increased amoeboid action the white blood-cells, and their consequent migration. By the study of the phenomena of osmosis, we learn that stagnation of fluid and intra-vascular tension induce outflow; but reverse the latter condition, increase the rapidity of the circulation, and, with the constitution of the blood, an outflow must result.

From these studies, I am forced to conclude that a theoretically perfect remedy for incipient inflammation must comprehend the following effects: it must either lessen the *vis-a-tergo* of the heart's action, so as to prevent injury to the vascular walls by over-distension, and the consequent outpouring of liquor sanguinis; it must prevent such an ingress of blood into the affected area as would produce the excess of oxygen, the migration of cells, the blocking-up of the lymph-spaces, etc.; or, what would practically amount to the same thing, it must so lessen the difficulty of escape on the venous side, that, howsoever great the *vis-a-tergo*, a ready draining-off, nay, aspiration as it were, of the venous blood, may occur. If possible, both these effects must be produced. The last requisite would be, that the remedy must increase the frequency, while it lessens the force, with which the heart acts; for, although whatever would lessen the *vis-a-tergo* would prevent any further outpouring of pabulum, yet that which was already exuded must remain, and would have to be consumed before the initiated cell-change could cease. In my experiments on the frog's tongue, I noted all the vascular changes described in the earlier part of this

paper. When the stasis was complete, a large vein on the distal side was divided; i.e., local bleeding was effected from the vessels directly leading from the inflamed area. I purposely avoided opening the vein on the cardiac side of the phlogosed spot, lest I might simultaneously divide the supplying artery. By severing one of the ranine veins at a point where I could distinctly see that the venous radicles of the inflamed area emptied, I achieved my purpose without further damage.

The effect upon the obstructed vessels was first an oscillation of the blood-disks, then an occasional momentary flow of blood, then suddenly a rapid resumption of the circulation, sweeping out the blood-vessels, and apparently restoring them to their normal condition, except at spots where the agents inducing the inflammation had chemically destroyed the vessels or coagulated their contents. I do not presume to say that the white corpuscles betook themselves at once back again into the blood-vessels; for I did not use sufficient amplifying power to observe this, nor was I then dealing with any other processes than the vascular changes. I should have carried my researches much farther, had I not seen that nothing was needed beyond a mere corroboration of Gensser's admirable paper, which I shall now quote:—

“At the present time it is generally accepted, that by local bleeding inflammatory stasis is relieved; but this view has not been demonstrated. Many adhere to the derivative action of bleeding, and many still believe in the loss of blood as such in the amount of blood drawn. The web of the foot of a curarized frog was burnt with a red-hot pointed needle, or with nitrate of silver. . . . As soon as . . . slowing of the current, and stasis, had taken place, a leech was placed near the hock-joint. . . . As soon as sucking began, the picture under the microscope changed in a striking manner. The blood-current was immediately accelerated, blood-corpuscles which adhered to the wall passed into the blood-current; stasis was relieved: briefly, the inflamed capillary loops were in a short time—sometimes in a few minutes—entirely free, and presented in a few cases, at the termination of the experiment, the appearance of a perfectly normal and even accelerated circulation.”

The authors were unable positively to determine whether the migrated white blood-cells “were in any way influenced by the bleeding.” Owing to the tardy rate with which the

blood was effused after scarification, the author stated that the good effects were not comparable to those of leeching. In like manner, general bloodletting, by opening an abdominal vein, was inferior to leeching near the affected area. Dr. Gensmer considers it proven, "that the antiphlogistic effect of local bleeding is due to a purely mechanical cause. Through the stronger current caused by the sucking of the leech (or by a cupping-glass or by scarification) is the blood-corpuscle, which adheres to the wall in the inflamed territory, torn away, the obstructed capillary perfectly opened, and there is a normal, indeed a temporarily stronger, circulation established. . . . Local bleeding prevents stasis. Bleeding not only does not cause local anæmia, but even occasions (of course transiently) arterial hyperæmia; that is, it causes a more intense flow of arterial blood to the inflamed point. Further, this abundant supply of arterial blood results in a better nourishing of the tissue; and that, therefore, the tissue is better able to withstand the effects of the inflammatory process, is to be expected. It further follows, that the antiphlogistic effect of bleeding depends upon the quantity of blood drawn, and that, in the first place, only the rapidity of the current is to be considered. Evidently the bleeding must take place, when possible, between the inflamed point and the heart, and not far from the former."¹

What the effects of bloodletting are upon the general circulation, has an important bearing upon the subject we are now discussing. According to the latest authority, "the water is increased, and the globules . . . [oxygen-carriers] *are diminished* in relative amount. . . . The action of the heart becomes *more rapid*, and its force lessens [the Italics are mine]; the arterial tension falls. [But how about the evil effects of bloodletting?] It is a remarkable fact, perfectly well known to old practitioners, and to which Sir James Paget has recently called attention, that the ill effects of bleeding in healthy subjects are very temporary, and easily repaired. The blood-globules, which are relatively more affected by bleeding than the other constituents, are

¹ Dr. Alfred Gensmer, Halle. *Centralblatt für die medizinischen Wissenschaften*, April 1, 1882.

quickly reproduced." As surgeons, we must all have had ample proof of this fact. Some years since, while pursuing other investigations upon human blood, I observed the same fact, and noted it in the published report of my work. I need hardly point out, that if my experiments, with those of Gensmer's, are reliable, and the other facts quoted are really facts, our ideal remedy is found. From the quotations given of Gensmer's paper, it is clear that our experimental results exactly tally. I think, however, that the superior advantages of leeching over scarification, etc., can hardly be similarly obtained in the human subject, since the relative size of the leech to the frog must have had a considerable share in effecting the good obtained by an actual aspiration of the blood. In my own experiments, by dividing a large vein in the tongue, I obtained the effect of bloodletting pure and simple. To produce the best results, then, we should, when possible, bleed from one of the principal veins leading from the inflamed focus. When this is impossible, leeching or wet cups should be resorted to, since by both the mechanical effects of aspiration are superadded to the mere outflow of blood. But many authorities maintain that bloodletting can be dispensed with in all cases, for exactly the same results are obtained by the use of arterial sedatives. To test the truth of such statements, it is only requisite to experimentally induce inflammation, and then give a large dose of gelsemium. The arteries are seen to become smaller, the current slower, and if stagnation has already occurred it increases or remains stationary. This and similar remedies, then, reverse that which, both upon theoretical and experimental grounds, we have found to be most effectual. They certainly also interfere with the rapid absorption of effusions.

From a review of the facts set forth in this paper, I think I am warranted in stating the following propositions as the logical and practical outcome of my investigations:—

1. During the stage of dilated arteries, with increased rapidity of the current, but little danger of capillary changes with exudation need be apprehended; and here perhaps ergot, certainly arterial sedatives, do good, either directly or

indirectly, without bloodletting, by reducing the size and rapidity of the current, thus allowing the veins of the irritated area time to empty themselves, even of an unaccustomed amount of blood. Thus, if vascular-pressure changes have taken place, the vessels have an opportunity to return to the norm.

2. After stasis has occurred, or while it is occurring, weakening of the heart's action and a diminished volume of the current — e. g., the effect of arterial sedatives — can do nothing but harm to the inflamed area; although, for the reasons given in proposition 1, it may prevent extension of inflammation in the circumjacent parts, which are merely in the earlier stages of congestion.

3. The results to be sought, and which are secured by local bloodletting, are removal of the blood on the venous side, so that the vessels can not only empty themselves, but a certain amount of *vis-a-fronte* — i.e., aspiration — is invoked: this secondarily results not only in a temporary return to the norm on the arterial side, but an increased rapidity and (here is an important point) lessened force of the circulation. The acceleration of rate, without the weakened force of the circulation, would further damage the vessels; instead of which, the increased rate of the current merely serves to sweep out the accumulated red blood-cells, the cause of the excess of oxygen, and the consequent cell-migration. The vehement current also induces a rapid resorption of the effused liquor sanguinis, at once the stimulator to growth, and the food of the cells. This latter advantage is not founded on theory alone; for it is a matter of common observation, that the mere amount of blood extracted produces no sensible effects on an inflamed breast, for instance, *at first*; but in a few hours the skin, if carefully examined, has become wrinkled, and the organ shrunken. This effect is secondary to the loss of blood, and chiefly results from the absorption of the inflammatory exudate.

4. Arterial sedatives in the later stages are usually inadmissible, except as succedanea to bloodletting, as far as the focus of inflammation is concerned: the surrounding parts, which are merely congested, may be benefited by their ex-

hibition. After bloodletting, they act favorably, because, when the stasis has been overcome, they lessen intra-vascular pressure, and thus permit the blood-vessels to recover their normal condition. They also alleviate pain by lessening the bulk of blood in the part; i. e., they relieve nerve-pressure.

As before intimated, this essay is in reality little more than a few notes on the effects of local bloodletting, and does not pretend to cover the extended field of either the local or general treatment of inflammation. If my remarks prove fruitful in the way of an instructive discussion, which may induce some of my hearers to resort anew to this useful but neglected remedy, I shall feel amply rewarded.

Tincture of Iodine in Erysipelas.—Hutchinson narrates the history of a large, robust man, of very plethoric habit, a free liver, and in every way the type of man one would expect to have a violent attack of an inflammatory disease like erysipelas. Iron and the usual remedies had been given; and, when first seen, he was unconscious and rambling.

The hair was cut away, and the scalp was painted with tincture of iodine. The dose of iron was increased, and 2.5 spts. of chloroform were added to each dose. The next day the redness had subsided, the stiffness was nearly gone, and consciousness was returning. The second day he was out of danger, and he was soon convalescent. (*Br. Med. Jour.*, Aug. 5, 1882.)

A Demonstration of the Feeble Influence of Iodine over Malarial Fevers, based upon an Analysis of Seventy-six Cases of Intermittent and Remittent Fevers treated with the Agent.—Atkinson and Woods draw the following deductions as to the use of iodine in *acute malarial poisoning*:—

1. In intermittent fevers, it has some feeble influence in controlling the paroxysms.
2. It takes usually from three to eight days to exercise this influence.
3. In cures effected, there is great danger of a relapse; certainly as great as when Peruvian bark is employed.

4. It is certain to add to any existing diarrhoea or nausea, and is liable to cause each if they do not already exist.

5. In remittents, its effect, if any, is seen in a slow and gradual reduction of temperature; and this reduction is liable to sudden interruptions.

6. In both forms of fever, it is infinitely inferior to either cinchonidia or quinine; certainly as regards the immediate control of the fever, and, as far as we were able to judge, as regards relapses also.

7. From an economic point of view, the slowness and uncertainty of its action makes its use in hospital-practice fully as expensive as Peruvian bark.

8. There seems to be some ground to believe that it can cause albuminuria.

9. In the large majority of cases of ordinary acute malarial poisoning, it has no influence whatever. (*Am. Jour. Med. Sci.*, July, 1883.)

Treatment of Malignant Pustule by Injections of Iodine. — Richet relates two cases of malignant pustule treated by injections of tincture of iodine. One died in forty-eight hours, while the other recovered after eight injections of the tincture diluted with two parts of water. In both cases, inoculations of animals with pus from the pustules were followed by fatal results. Inoculations with the blood of the first patient were also fatal, while the blood of the second caused no infection. The author concludes from these cases, that when the infection is general, when the blood contains the specific bacilli, local treatment is useless; but, on the other hand, if injections at the periphery of the pustule are made before the disease has spread from its point of origin, a cure may be obtained. (*Centralbl. für Chir.*, July 21, 1883; *N. Y. Med. Record*, Sept. 8, 1882.)

Poisoning by Iodine. — Mondon reported this case to the Société de Pharmacie du Sud-Ouest. A neighbor brought to him a young child which had swallowed 15. of tincture of iodine (1.2 of metallic iodine). The child had violent colics, an ardent thirst, an obstinate dry cough, re-

sembling that provoked by chlorine : the mouth and lips were colored yellow by iodine. The severest pain seemed to be in the belly, which the child scratched in its fury. A solution was made of hyposulphite of soda 2., common water 150. Teaspoon after teaspoon of this was given, and the vomited matter became less yellow. The child suffered less : it seemed to rest, although exhausted, and the vomiting ceased. A physician then took charge of the case, and prescribed milk and starch. (*Rev. de Thérap.*, June 1, 1883.)

EXPERIMENTAL STUDIES ON THE PHYSIOLOGICAL ACTION OF IODOFORM.¹

[Work of the laboratory of experimental and comparative pathology of M. Vulpian.]

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[Translated by Dr. George B. Phelps, Interne at the New-York Hospital.]

Righini of Novara, in the latter part of 1853, recommended the employment of iodoform as an antiseptic and disinfectant, and became thus the pioneer in the dressing of wounds by iodoform. Immediately the surgeons of nearly all nations, with more or less warmth, recommended iodoform as a dressing for atonic and torpid ulcers, for syphilitic ulcers, soft chancres, some uterine affections, cancerous ulcers, etc.; employing thus the antiseptic and disinfectant action of the drug locally.

In the course of 1880 a sort of revolution came about: iodoform left the limits of minor surgery, where it had been till then confined, and entered the domain of major practical surgery. Mosetig-Moorhof, Billroth, Gussenbauer, König, Hoffmann, Rosenbach, etc., announced iodoform as a powerful antiseptic drug in the dressing of abdominal wounds.

Germany sought to substitute iodoform for phenic acid imported from England. The results were favorable; and in Austria, as in Germany, the carbolic dressing gave place to the dressing of iodoform.

In Italy, M. P. Lupó, by his experimental and clinical

¹ The principal results of these experiments were communicated to the Academy of Sciences, in an extract presented by M. Vulpian on April 10 (*Comptes rendus*, etc., 1883.)

researches, confirmed the use of the iodoform dressing, which he declared superior to carbolic.

The re-action against iodoform did not fail to appear. Surgeons, not knowing well enough the properties of the weapon they used, abused it, and found themselves in the face of a terrible accident, — poisoning.

The enthusiasm of the first moment diminished with rapidity.

The exaggeration in one way was followed by another in an opposite direction. Besides the well-authenticated poisonings by the application of iodoform to abdominal wounds (MM. Mikulicz, Hoeftmann, Max Schede, König, Koche, Czerny), clinical histories of the poisoning by iodoform multiplied, which were nothing but the natural consequences of the disease or its complications (pyæmia, septicæmia, intercurrent maladies, etc.). Although Mosetig-Moorhof, after having tried iodoform as a dressing upon three thousand hospital cases and about four thousand out-patients, had not discovered a single case of poisoning, one cannot doubt the possibility of such an accident. Among the patients of M. Mosetig-Moorhof, the accident has not been observed, because the iodoform was not used in sufficient amount, as the dressings were rarely renewed without the wounds having been previously washed.

All authors are in accord in admitting three classes of morbid phenomena in poisoning by iodoform : —

1. Gastro-intestinal troubles : anorexia, loathing of food, taste of iodoform in the mouth, coated tongue, epigastric pains, vomiting, and sometimes diarrhœa.

2. Cardio-vascular troubles : the pulse is accelerated to 130–140 beats per minute, becomes irregular, and in some cases the pulse-wave is weak ; the pulse and heart's action denote threatening syncope.

3. Nervous troubles : psychical phenomena appear ; periods of excitation ; agitations, hallucinations, tendency to suicide, impulsive mania, furious delirium ; in some it is possible to find a period of depression characterized by melancholia, particularly sadness with a tendency to weeping, somnolence, loss of memory, comatose state. It is not rare to see convulsions and paralysis.

The greater number of authors claim an elevation of temperature regularly in poisoning by iodoform. Others do not believe in an elevation: Falkson, especially, believes the fever is never iodoformic, but a septic fever.

In 1882, at Naples, in the clinic of Professor Renzi, having administered iodoform to two diabetics during twelve days, in increasing doses, up to two grams in twenty-four hours, to verify the researches of Professor Moleschott of Rome, I was struck with the following fact: the pulse, instead of being increased in frequency as has been claimed, was diminished markedly, and the blood-wave distended the arterial walls forcibly.

The patients complained at first of a persistent tendency to sleep, followed by insomnia, of a taste of iodoform, of a diminution of hunger, of headache, and of itchiness of the skin.

The fact of the diminution in the pulse-rate, and increase in the strength of the pulsations, impressed me strongly; for I had in mind the opposite phenomena mentioned by some authors in poisoning by iodoform.

In examining the above facts, I concluded that physicians must have studied the pulse only when the poisoning appeared with all the train of threatening symptoms: they did not see the primary effects of the action of iodoform upon the heart.

If one seeks an explanation of the morbid process of the poisoning by iodoform and its mechanism; if one asks information from experimental physiology upon this subject, notwithstanding the remarkable works of Bouchardat, Righini, Franchini, Humbert, Moretin, Scalzi, and those more recent of Floucaud, M'Kendrick, Binz, Möller, Högyes, — one does not find very exact information.

The symptoms of the nervous and gastro-intestinal disorders have been studied upon animals; but the study of the nervous disorders is not complete, and their pathogenic mechanism has not been defined: for the others, the results obtained are subjects of contention.

In relation to circulatory disturbances, experimental pathology is entirely silent.

Impressed by the grave phenomena of the poisoning by iodoform described recently by some German authors, and by certain morbid states, which are not produced by this poisoning; wishing also to study methodically the circulatory disturbances in animals; and believing also, with Nothnagel and Rossbach (*Traité de Matière Médicale*), that the physiological action of iodoform is not exactly known, — in December, 1883, I undertook new researches upon iodoform in the laboratory of comparative and experimental pathology of Professor Vulpian of the Faculty of Medicine.

I have sought to study the morbid phenomena induced by iodoform, with all the resources of experimental pathology and physiology that I have been able to possess, with a great number of animals, batrachians and mammals.

I have profited by the wise counsels of the eminent Professor Vulpian, and his chief assistant M. Bochefontaine; to whom I express my most sincere thanks for the interest they have shown, and the willingness with which they have aided me, in my researches.

I.

Historical and Critical Review of the Physiological Action of Iodoform.—In the history of iodoform, one may distinguish four periods:—

The first is wholly chemical: it embraces the discovery of the substance in 1822, and its analysis.

The second, separated from the first by fourteen years of silence, relates to the first experiments upon the physiological action of the drug, and its employment in therapeutics (1836). The knowledge concerning iodoform acquired during this period belongs almost wholly to France. Afterward, for seventeen years, iodoform is rarely mentioned.

The third period commences in 1853. In Italy appeared the remarkable works upon the physiological action of the drug, and some of its therapeutical applications. At the same time these studies were renewed with vigor in France: however, for sixteen years they did not make great progress.

The last period—that concerning experimental physiopathology—is characterized by works of verification belong-

ing especially to Germany. In this period were studied with care the anatomical and pathological changes, and the most remarkable applications of iodoform to surgical and medical therapy appeared.

Among them should be noted the remarkable researches of Professor Semmola, who first recommended the employment, internally, of iodoform in pulmonary phthisis. At that time I introduced into the therapeutics of chronic lung-diseases the inhalation of iodoform dissolved in oil of turpentine. This treatment has been carefully tried by M. Davezee of Bordeaux. It is necessary to mention the application of iodoform, made by Moleschott, to affections of the heart and in diabetes.

In an article published at Metz, in 1822, Serullas announced his researches upon the iodide of potassium, hydriodic acid, and upon a new compound of carbon, iodine, and hydrogen.

In 1834 Dumas, on Jan. 13, read a paper before the Academy of Sciences, and described completely the substance discovered by Serullas, called it iodoform, and gave its analysis. Speaking of chloroform, bromoform, and iodoform, he says that these three substances are related by lines of a close resemblance; since one obtains them by treating the alcoholic solutions of chlorine, bromine, and iodine, with an alkali.

The honor, then, is due to Dumas, of having established the true nature of iodoform, as to Serullas belongs the honor of having discovered this substance.

In a paper presented to the Academy of Sciences, Oct. 24, 1836, M. Bouchardat anticipated the future of iodoform. Recognizing the fact of the large proportion of iodine which it contains, — nine-tenths of its weight, — he recommended its use internally, especially in scrofulous enlargements and goitre. The author undertook some of the first studies upon the physiological action of the drug, and stated, that, if one places fishes in water containing iodoform, one notes, at the end of some time, the signs of general anæsthesia, which disappears if the animals are placed in pure water.

A work published in England in 1837, by Mr. Cogswell, contains the following:—

"At eleven A.M., an active, strongly built terrier was made to swallow 50 grains (about 3.24 grams) of iodoform enclosed in a paper. The next day the animal was lively, and in appearance suffered none: however, it showed repugnance for food. The third day, it was not disposed to rise, and, finally, made but feeble efforts to crawl; the heart beat irregularly, and the belly was drawn in toward the vertebral column. During the fourth day, the animal remained lying on one side, and giving no sign of consciousness; the head in extension; each respiration was accompanied by a deep groan, and followed by a general convulsive movement; the mouth closed, the eyes open, pupils normal, eyelids winking naturally. Death followed in the night.

"At the autopsy, a great rigidity of the muscles, a marked congestion of the lungs, and evidences of irritation were found, as well as a blackened appearance of the stomach. All these facts show the perfect analogy between this substance and chloroform in regard to their physiological action."

After the researches of Bouchardat and Cogswell, iodoform fell into oblivion; whence it was brought forth in 1853 by Giovanni Righini, a chemist of Novara.

This author repeated the experiments of Bouchardat, and ascertained that leeches placed in iodoformized water are at first seized with convulsive movements, and afterward become completely immovable. Thrown into cold water, some revived; while others, having doubtless absorbed too much iodoform, died. According to this author, iodoform does not exercise any deleterious action upon the organism. It is possible to administer three grams a day internally, without determining any phenomena of intolerance. One finds iodine in the blood, saliva, perspiration, and urine; the odor of iodoform is exhaled through the nostrils, and is communicated to the pocket-handkerchief. It is found in the bile, saliva, the milk of nursing-women, nasal mucus, the amniotic waters, and, naturally, in the fæces. One demonstrates the presence of iodine in the liquids of the organism by employing a solution of starch with nitric, sulphuric, and hydrochloric acids; obtaining each time the characteristic blue color of the iodide of starch.

According to Righini, iodoform, applied to the surface denuded of its epidermics, is easily absorbed, and causes a local anæsthesia.

This author does not admit the absorption of iodoform

applied to the unbroken skin ; for he has never been able to find the least trace of iodine in patients treated by baths, ointments, or soaps of iodoform. He speaks of the hypersecretion of urine, saliva, bile, bronchial fluid, after the administration of iodoform. Finally, he recognizes powerful antiseptic properties in iodoform.

M. Maître showed the presence of iodine in the secreted fluids, in the feathers of a duck, and in the hairs of a guinea-pig poisoned by iodoform ; verified the experiments of Righini upon leeches ; and studied especially, with great care, the action of iodoform upon the nervous system.

A great number of experiments upon mammals allowed him to distinguish two periods in the nervous phenomena ; the first characterized by prostration and feebleness, and the second by convulsions and contractures. He did not note remarkable alterations at the autopsy.

Moretin and Humbert in 1856 repeated the experiments of Bouchardat upon frogs, and obtained similar results. In their experiments upon mammals, they observed the two periods in the nervous disturbances described by Maître. They state, that, in large doses, the drug is absorbed as iodoform, penetrates all the tissues, and is to be found in the urine also.

Franchini declares, as Righini, that iodoform does not have a deleterious effect upon the system, even in large doses. He has especially studied its action as an anæsthetic upon mammals. He employed a balloon furnished with two tubes, each the size of the trachea of the animal, and provided with a sponge charged with about two grams of iodoform. One tube being fixed in the animal's mouth, the inhaled air traversing this apparatus was usually sufficient to produce the medicinal effects. According to him, one may distinguish two periods in the action of inhalations of iodoform : —

At first, great agitation : the animal struggles, turns itself, the pulse is quickened, sensibility is exaggerated, contractures show themselves. After a minute, quietness comes on, the respirations become regular, the muscles become relaxed, sensibility is lost centripetally : one may divide the muscles without the animal showing any manifestation of sensation.

All these authors are in accord in admitting that iodoform, in relatively large doses, has not a topically irritating action, and that, in animals poisoned by it, one does not find evidences of material changes in the viscera. The same authors, except Maître, affirm that iodoform increases the quantity of urine.

Before speaking of the German authors, it is necessary to glance at the studies of Floucaud and M'Kendrick, who have sought to cast a doubt upon a great part of the facts already observed. Floucaud presented to the Faculty of Montpellier, in 1872, a thesis remarkable for the description of the anatomical alterations. After giving dogs iodoform in doses of a gram, for several days, up to eight and a half grams, it is evident that he has not observed, during the days following the administration of the drug, the phenomena which we have described.

For the researches of the author, one may formulate the following propositions: —

1. Iodoform has an evident local anæsthetic action.
2. With large doses, he has never observed the influence of the drug upon the nervous system, the muscular contractions, opisthotonos, or diminution of general sensibility.
3. He has seen in some dogs a certain amount of distress, — nausea, intense thirst, diarrhœa, a little tenesmus, and some drops of blood in each movement.
4. Iodoform causes a profound change in the blood-corpuscles. Its action upon the viscera is characterized by a fatty degeneration, of the liver especially.

John G. M'Kendrick, in a communication to the Medico-Chirurgical Society of Edinburgh, June 3, 1874, compared the physiological action of hydrates of chloral and bromine with that of iodoform.

He recalls the several analogies which exist, in a chemical point of view, between chlorine, bromine, and iodine. These metalloids not only have a great resemblance, when studied as elements, but the same similarities are found when they are combined with other elements.

All are capable of replacing hydrogen in several organic compounds. One or several atoms of chlorine, bromine, or

iodine, may take the place of an equal number of atoms of hydrogen, without altering the molecular state of the primitive compound.

After having spoken of the physiological action of chloral and bromal, he takes up iodoform.

He injects under the skin of mammals a solution of .06 of iodoform in .32 of alcohol and 100. of water.

The effects were similar to those which chloral produces, with the following differences:—

1. The period of hyperæsthesia is wanting.
2. Iodoform irritates the nasal mucous membrane.
3. .65 of iodoform, subcutaneously injected in rabbits of about 1,300 grams weight, produced a profound sleep during a period of four hours; .80 of iodoform killed rabbits of about the same weight in two and one-quarter hours.

The lethal dose appears thus to be somewhat less than in the case of chloral.

4. The animals died without convulsions.

In Germany, Binz and Möller (1877) studied the physiological action of iodoform on mammals, using hypodermic injections of the substance suspended in the oil of sweet almonds, and ingestions of the drug suspended in water, the white of an egg, or milk, in doses from one-half to three and a half grams.

The results may be thus tabulated:—

1. Iodoform given internally and subcutaneously to the dog, and especially the cat, exercises a narcotic action.
 2. The iodate of soda, and iodic acid, present the same narcotic action.
 3. The narcotic action of iodoform, the iodate of soda, and of iodic acid, is due, very probably, to the iodine which is liberated from the compounds in the process of absorption, and acts in the nascent state upon the nervous cells.
 4. A toxic dose of iodoform determines an acute fatty degeneration of the viscera;
 5. The animal dies, presenting the symptoms of general paralysis, and a considerable lowering of the temperature.
 6. There were neither contractures nor convulsions.
- A. Högyes (1879) studied the action of iodoform with

many and varied experiments upon dogs, cats, and rabbits. His conclusions are as follows :—

1. Iodoform in small dose is a poison for dogs, cats, and rabbits : it causes generally, in dogs, emaciation of the body, and death, which follows slowly, without convulsions, after paralysis of the heart and respiration.

2. In large doses, it produces sleep in dogs, still oftener in cats. The reflex movements persist even during the most profound narcotism.

3. At the autopsy of animals poisoned by iodoform, the viscera are found degenerated.

4. Iodoform dissolves in the fatty substance with which it comes in contact, under the skin, in the stomach, in the serous cavities. In this process of solution, iodine becomes liberated, and is changed into the iodide of albumen in the presence of albuminous materials.

Finally, freed from its combination with albumen and fat, iodoform leaves no evidence of modification of the tissue upon which it has acted.

5. The general action of iodoform is similar to iodine ; with this difference, that pure iodine does not determine fatty degeneration or narcotism.

6. Iodoform and the iodide of albumen are eliminated principally in the urine, in the state of metallic compounds soluble in water.

If one seeks, without regard to interpretations and theories, to summarize the facts observed by different authors relative to the action of iodoform, he sees that :—

1. All authors admit the local anæsthetic effect of iodoform.

2. The general anæsthetic action is admitted by Bouchardat, Righini, Maître, Humbert, Moretin, and Franchini : it has not been ascertained by Floucaud, Binz, Möller, and Högyes.

3. Nearly all authors affirm the paralyzing and narcotic action of the drug.

4. The convulsive action has been seen by Cogswell, Righini, Scalzi, Humbert, and Moretin : it is not mentioned in the works of Floucaud, M'Kendrick, Binz, Möller, and Högyes.

5. Iodoform has a powerful antiseptic action (Righini and Floucaud especially).

6. The authors are not in accord regarding the influence of iodoform upon the secretions and the gastro-intestinal tract.

7. All the authors state that the iodoform is eliminated principally as an iodide; in the form of iodoform, by the urine, after large doses (Humbert and Moretin, Gulberd) and by the respiratory passages (Righini, Semmola).

8. Before Floucaud, no one had noticed material changes in the viscera. These were studied by Floucaud, Binz, Möller, and Högyes. These observers, however, did not speak of changes in the brain or spinal cord, nor of renal lesions, except the fatty degeneration.

From this review, it is seen that opinions differ in regard to certain important facts concerning the physiological action of iodoform.

In my opinion, all these differences depend upon the dose employed, upon the chosen channel of absorption of the vehicle adopted, upon the kind of animal, the source of the drug, upon a tendency to see in iodoform actions analogous to those of other substances with which it has a chemical affinity, etc.

It would seem that physico-pathological experiments upon the heart and blood-vessels, in poisoning by iodoform, have not yet been tried. No one has yet methodically studied the mechanism of the action of the drug.

II.

Experiments upon the Physiological Action of Iodoform.—The insolubility of iodoform in liquids proper for subcutaneous and intra-venous injections offers a difficulty to the study of the physiological action of the substance, to which, without doubt, should be attributed the incomplete facts reported by authors.

Iodoform is nearly insoluble in water, for a thousand grams of this liquid dissolve only .20. It is very little soluble in alcohol: to dissolve one gram it is necessary to employ eighty of alcohol. It is more soluble in oils: one

part of iodoform dissolves in twenty-four parts of olive-oil, almond-oil, etc. I have ascertained that it is about the same for the essential oil of turpentine.

Chloroform, ether, and benzine dissolve it better : one part of iodoform dissolves in fifteen of chloroform, in seven parts of ether or of benzine.

The best dissolvent of iodoform is bisulphide of carbon, for one part of iodoform will dissolve in four parts of this liquid.

Iodoform is slowly volatile at an ordinary temperature. At a more elevated temperature, not above 100° , it sublimes. It is decomposed at 120° , giving origin to hydriodic gas, and vapors of iodine : there remains a residue of carbon.

These data indicate the method by which to study the physiological action of iodoform : it is necessary to employ the drug reduced to a very fine powder, or in solutions in pure olive-oil or the oil of sweet almonds, or inhalations of the vapors with an appropriate apparatus. It is necessary to avoid absolutely the alcoholic solutions, or solutions in ether ; for these drugs have a special action of their own, which masks that of iodoform.

Before commencing the study of the physiological action of iodoform, I will indicate the principles I have followed, in the hope of avoiding confusion, and arbitrary interpretations of the phenomena observed.

1. Not to limit the study of the action of the drug to a single species of animal.
2. To report the results obtained upon one species, without hastening to attribute them to others.
3. To try the different modes of absorption, but to choose for a special case that which proves most advantageous.
4. To study a given order of phenomena, by always introducing the drug in the same manner.
5. To introduce the drug into the body in its native state, or in dissolvents which have no action in themselves.
6. To commence the experiments with small doses, and, by degrees, to arrive at large doses.
7. To determine exactly the dose employed.

8. To study the forms of poisoning,—acute, sub-acute, and chronic.

9. Finally, to take account of the possible cumulative action of the drug.

The study of the physiological action of iodoform has taken a great number of animals, batrachians (frogs) and mammals (guinea-pigs, rabbits, and dogs).

The iodoform used was prepared in the laboratory of Professor Wurtz, by M. Oechsner, to both of whom I express my sincere thanks for their kindnesses.

To apply the results of experiments on animals to human physiology, it is necessary to choose, as subjects for the experiments, animals whose organism is not widely different from that of man. But if it is desired to study completely, and during a long time, the functions of certain organs, it is necessary to employ cold-blooded animals,—frogs, for example, which, by their peculiar organization, are adapted for certain operations impracticable upon mammals. Thus, upon frogs, we may take away the sternum, and expose the heart, without a great disturbance of the functions of the organ. The heart will beat regularly for several days, and during all this time the animal breathes and leaps. Pulmonary respiration may be destroyed by removing the lungs, and considerable mutilation of the nervous apparatus will not instantly kill the animal.

But, if frogs offer all these advantages, they present disadvantages which one ought not to forget under penalty of committing grave errors. Thus, if we introduce under the skin of the thigh or trunk diffusible products in solution, the substance spreads by diffusion gradually until it reaches a considerable distance from the place of introduction. In this respect, frogs are comparable to blotting-paper; and, if we do not take this properly into account, we may easily confound a local effect of impregnation with general effects.

In studying the action of iodoform upon the heart and central nervous system of the frog, I have at first employed subcutaneous injections of very fine powder, but always at a point as far removed as possible from these organs; that is to say, under the skin of the tarsus.

Among mammals, I have chosen the dog as the best adapted to show the complete picture of the poisoning by iodoform.

The best channel for the absorption of the drug is through the stomach. The iodoform is introduced in very fine powder, hidden in a piece of liver; avoiding solutions in oils and suspensions in water, which produce vomiting.

Another channel which may be utilized in the absorption of iodoform is the peritoneal cavity. Many times I have introduced into the peritoneum of a dog, rabbit, and guinea-pig, a solution of iodoform in pure olive-oil recently prepared; and nearly all the phenomena of poisoning have followed *without ever producing peritonitis*. I have been able to produce a certain degree of poisoning by inhalations of the vapors of iodoform.

For this I employed an apparatus which permits the penetration into the lungs of the vapors of iodoform, and does not prevent the elimination of carbonic acid, — a point that may elicit criticism in similar researches of Franchini.

To the pipe of the machine for artificial respiration, I adjusted a balloon with two tubes, in which is placed powdered iodoform. The lateral orifice of the tracheal tube, through which the expired air goes out, has a valve which closes the opening at the moment of inspiration, and opens it during expiration. The balloon containing the iodoform is placed in a vessel nearly filled with water at a temperature of 39° C.

Under these conditions, the air which goes through the apparatus takes up the iodoform vapors disengaged in the balloon, and carries them to the lungs.

The expired air passes out without any obstruction through the lateral openings in the tracheal tube.

The physiological action of iodoform has been studied when applied upon the denuded dermis, or upon wounds, or introduced under the skin after solution in olive-oil. It is not practicable to employ intra-venous injections for the powder of iodoform; and its solution in oil mixes quickly with the blood in circulation, producing dangerous coagulations and emboli.

Before going farther, it is useful to consider what the doses of iodoform are which ought to be considered as toxic in different animals.

1. .02 of powdered iodoform, inserted under the skin of a frog weighing 30 grams, causes death at the end of twelve to twenty-four hours. A dose of .04 kills the animal in the space of six to twelve hours. The animals are able to survive doses of .005 to .008.

2. Upon guinea-pigs of average weight, the dose of iodoform by stomach, or injected into the peritoneum, necessary to produce death in the space of two or three days, is 1.50-2.

3. Upon rabbits weighing 2,000 to 2,300 grams, death follows in two or three days, from doses of 2.50 to 2.75.

4. To kill a dog of about 1,000 grams weight, at the end of two or three days, it suffices to administer by the stomach or intra-peritoneal injection 4. of iodoform.

The same dose in a very vigorous dog did not produce death in the same space of time. The animal succumbed after six days. It was in a state of very advanced marasmus. The necropsy showed a very diffuse, catarrhal affection of the bronchi, with lobular pneumonia.

In applying to man the results observed among animals, it is seen, that, to place life in danger, it would be necessary to introduce 20.-24. of iodoform into the stomach or peritoneal cavity. We reason as if man were not more sensitive to this agent than dogs, but we are not authorized to establish without reserve a comparison of this sort.

1. Action of Iodoform upon the Circulation and Respiration.—I have studied the movements of the heart in the frog by means of Marey's cardiograph, iodoform in very fine powder having been inserted under the skin of the tarsus.

Among the cardiac disturbances produced by iodoform, the most interesting to note is the diminution of the number of ventricular beats. This fact is constant: I have not seen it wanting a single time in a large number of experiments.

If we introduce under the skin of the tarsus .02 of iodo-

form, at the end of one or two hours a marked abatement in the pulsations of the heart is noted.

EXPERIMENT 1. — *Green frog, vigorous, of size above the average; heart exposed.*

2.25. — Ventricular systoles, thirty per minute.

2.30. — Injection, under the skin of the tarsus, of .02 of powdered iodoform.

2.45. — Cardiac pulsations, thirty per minute.

2.50. — Cardiac pulsations, twenty per minute.

3.00. — Cardiac pulsations, fifteen per minute.

3.10. — Cardiac pulsations, fourteen per minute.

3.20. — Cardiac pulsations, twelve per minute.

3.35. — Cardiac pulsations, ten per minute.

3.55. — Cardiac pulsations, seven per minute.

4.05. — Cardiac pulsations, six per minute.

4.25. — Cardiac pulsations, five per minute.

4.45. — Cardiac pulsations, three per minute.

5.30. — Cardiac pulsations, one per minute.

6.00. — The heart stops in diastole.

For doses which do not exceed .02, the diminution of cardiac pulsations follows slowly; but, if we employ doses of .03–.04 of iodoform, we see that the number of cardiac pulsations diminishes in ten to twenty minutes.

EXPERIMENT 2. — *Green frog, vigorous, of size above the average; heart exposed.*

12.40. — Ventricular systoles, forty per minute.

12.45. — Injection, under skin of tarsus, of .035 of iodoform.

12.50. — Cardiac pulsations, thirty-five per minute.

12.55. — Cardiac pulsations, eleven per minute.

1.00. — Cardiac pulsations, twelve per minute.

1.10. — Cardiac pulsations, ten per minute.

1.20. — Cardiac pulsations, nine per minute.

1.30. — Cardiac pulsations, eight per minute.

1.45. — Cardiac pulsations, six per minute.

2.15. — Cardiac pulsations, four per minute.

4.00. — Heart stops in diastole.

With doses of .035-.04, there is observed an interesting though not constant phenomenon, which is not produced with doses of .01-.02. This phenomenon consists of a very short period of increase of the frequency of the cardiac pulsations beyond the normal number, and which comes on in the period of abatement.

Injections of iodoform increase, after a certain time, the force of the ventricular contractions; and they are always regular and full.

Very rarely I have been able to note, after large doses, arrhythmic and irregular periods of cardiac contractions; which soon disappear, and permit the heart to resume its rhythm.

It should be noted, that the cardiac changes precede all other functional disturbances. When the pulsations of the heart have diminished one-half or more in number, the respirations remain nearly regular; the animal retains almost wholly the normal movements: it can easily pass from the dorsal decubitus to the normal position, while its heart beats very slowly. When the diminution of the cardiac pulsations becomes greater, the animal remains motionless, without volition; but, if excited, it then is seen to be able to execute energetic movements.

When the state of the heart is profoundly altered, the mobility diminishes in turn.

The study of the tracings of the heart in poisoning by iodoform show interesting phenomena. When the lessening in the number of the cardiac contractions is not advanced, we see that the ventricles contract regularly, sharply, with vigor, and without stopping.

They remain contracted an instant, and form upon the trace the classical plateau of the ventricular systole; but the notch which terminates the systole in the normal state is not seen upon this plateau. The diastolic fall takes place quickly.

When the diminution in the cardiac beats is advanced, the ventricular contractions are vigorous, and their energy is not diminished.

The plateau changes its character, and forms an ascending

oblique line. The diastolic descent does not take place suddenly, as in the first traces. After a quite rapid descent, it produces a curve which recalls somewhat that of veratrine; that is to say, the heart has preserved a certain degree of contracture before returning to the diastolic state. This relaxation appears only at the instant when a new systole takes place.

In a more advanced period, we determine that the duration of the ventricular systole is a little longer, the line of systolic ascent is more oblique, and the systolic plateau is less broad. Finally, the persistence of the diastolic contracture is more indicated, so that the trace tends still more to recall that of veratrine. (Figs. 1, 2, 3, 4.)

Numerous researches upon the movements of the heart, made with the forceps cardiograph, show that the disappearance of the notch at the end of the systolic line, and the production of the very exaggerated diastolic curve, are not absolutely constant characters; that these characters may be wanting in certain vigorous frogs, or exist in a very small degree, without the other characteristics of cardiac trouble ceasing to appear.

After three or four hours or more,—the time varies with the dose of iodoform employed,—the distended heart is arrested in diastole. At this moment, the application of a continuous current with the forceps of Pulvermacher provokes another ventricular contraction, followed by several spontaneous contractions resembling those of the last traces.

At the moment when the auricles refill the ventricles, we plainly distinguish the right, which is black, and the left, which is red. If, at the moment of extreme relaxation of the heart from poisoning by iodoform, we place upon this organ, or inject under the skin, three or four drops of a solution of the sulphate of atropine, we see, that, contrary to what is seen in poisoning by muscarine, the heart is in no way changed. The number of cardiac pulsations remains the same. In a few observations only have I been able to note that the notch is more marked after the application of atropine. (Figs. 5, 6.)

To determine the mechanism of the poisoning of the frog's

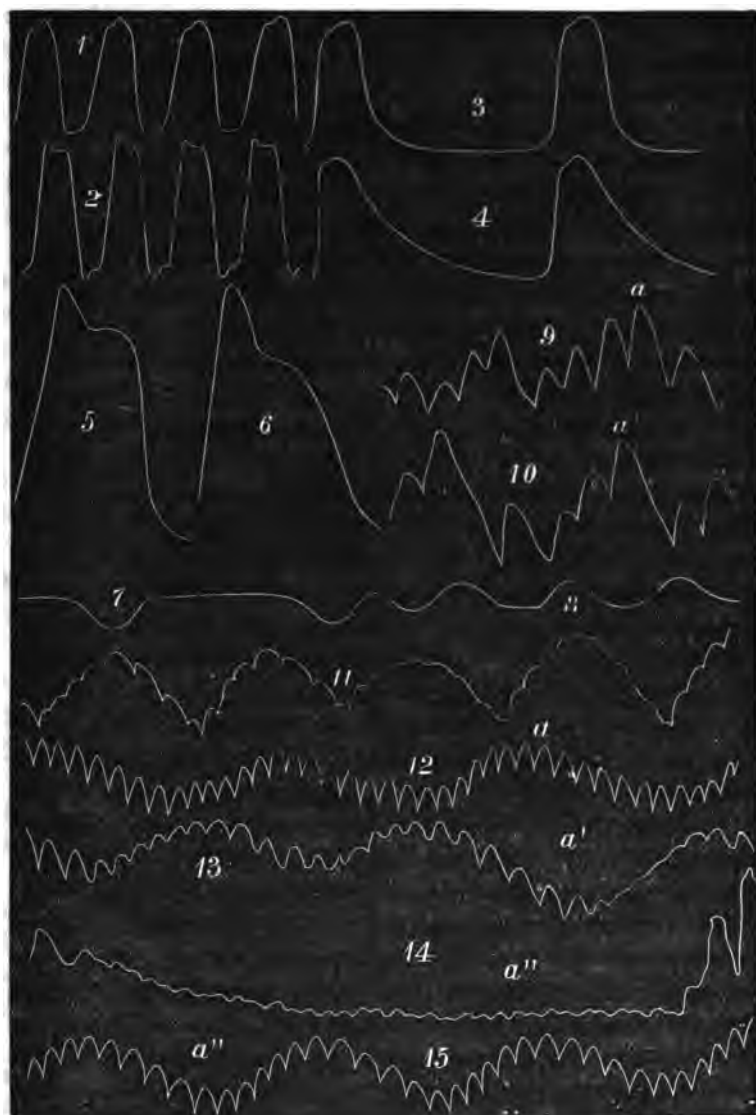


FIG. 1. Normal trace. 2. Twenty minutes after insertion under the skin of .02 of iodoform. 3. Trace after forty-five minutes. 4. Trace after one hour and fifteen minutes. 5 and 6. Traces after iodoform .03, and atropine. 7. Cardiogram after iodoform. 8. Same, five minutes later. 9. Normal carotid pulse. 10. Carotid pulse three hours after the swallowing of 3. of iodoform; *a*, *a'*, respiratory wave. 11. Trace five hours and forty minutes after ingestion of iodoform. 12. Normal trace. 13. Trace six hours forty-five minutes after *a*. of iodoform by the mouth. 14. Trace during a convulsive attack. 15. Trace after an attack.

heart by iodoform, I have made use of a very simple means which permits me to see if iodoform acts on the heart itself. It consists in studying the movements of the poisoned heart before and after its excision.

When the heart is in extreme slowness of action, if it be entirely excised, we see that it continues to beat with frequency, without attaining, however, the normal number of pulsations.

I have registered the pulsations of the heart excised and placed between the branches of a forceps cardiograph. Five minutes after the excision, the time required to adjust the apparatus, I obtained twenty-four cardiac pulsations a minute, instead of thirty-four obtained before the poisoning. (Figs. 7 and 9.)

If, before giving iodoform, the encephalon and bulb are removed, or if we destroy the bulb, the cardiac disturbances described do not take place.

At the beginning of the absorption of iodoform, a dilatation of the capillaries of the inter-digital membrane takes place, to which succeeds a progressive contraction.

With small doses, the cardiac action is modified, but the respiratory movements are nearly normal. After strong doses, we see an acceleration, perhaps a slowing, finally arrest, of respiration.

In the dog, the action of iodoform upon the circulation and respiration, after ingestion into the stomach, has been tested with a mercurial hæmodynamometer.

With .30-1., I have been able to observe a slowing of the cardiac actions to one-half of the normal number, with diminution of the energy, and without irregularity of the cardiac contractions: there is a small increase in the number of respiratory movements, and of the arterial tension.

With 2. to 4. and upwards, we obtain a progressive diminution in the number of heart-beats, and feebleness of the intra-carotid pressure, of about 10 cm.; at the end of four or five hours, we note the gradual return of the tension to the normal state, a return followed by an increase of about 3 cm. The number of respiratory movements increases little by little, presenting some irregularities.

In the mean time, there are, at times, periods corresponding to convulsive attacks, of which the duration varies between one and two minutes, during which the pulse is accelerated, and the pressure increases; if the pulse falls, the pressure is lessened: all returns in the same order.

In large doses, after the slowing of cardiac pulsations, there are acceleration and irregularity.

When the heart is no longer in communication with the central nervous system through the vagus, iodoform has no longer a notable action on this organ.

In order to understand the particulars of the cardiac disturbances in the dog, after the ingestion of iodoform, it is necessary to report in detail two observations relative to this subject.

EXPERIMENT III.—The dog, perfectly at repose, is put in communication, by his carotid artery, with the mercurial hæmodynamometer.

He is, however, neither curarized, chloralized, nor chloroformed: he is absolutely in a normal state. The animal weighs 13 kilograms.

A hæmodynamometric trace is taken in the carotid artery.

Average pressure, 134 mm.; pulse, 100; respiration, 17. (Each trace, or turn of the registering cylinder, represents a minute.)

10.15. — Ingestion of 6 grams of powdered iodoform in meat.

10.40. — Average pressure, 132 mm.; pulse, 108; respirations, 22. The inspirations are nearly all sudden.

11.40. — Average pressure, 128 mm.; pulse, 96; respirations, 21. Inspirations still more brusque than the preceding, all corresponding to a diastole of the heart.

12. — Average pressure, 123 mm.; pulse, 80; respirations, 20.

12.45. — Average pressure, 123 mm.; pulse, 84; respirations, 19.

1.20. — Average pressure, 136 mm.; pulse, 74; respirations, 17. Respiration and cardiac pulsation irregular.

1.40. — Average pressure, 138 mm.; pulse, 58; respirations, 16. Respiration and cardiac pulsation irregular.

1.45. — Average pressure, 136 mm.; pulse, 65; respirations, 14. Respiration and cardiac pulsation less irregular.

2.00. — Average pressure, 139 mm.; pulse, 68; respirations, 20. Respirations strong and irregular.

2.20. — Average pressure, 139 mm.; pulse, 88; respirations, 12. Pulse a little irregular. Respiration clearly shown on the trace, mingled with the feeble respirations which are confused with the beats of the heart, and which one is not able to count: the respirations which are indicated are still feeble.

The animal is allowed to rest.

6.05. — Average pressure, 159 mm.; pulse, 92; respirations, 11; nearly regular, and having a normal extension.

6.20. — Average pressure, 162 mm.; pulse, 144, regular, but more feeble than that of the preceding trace; respirations, 20, less extensive, and regular.

6.30. — Respirations, 17; very irregular in the first part of the trace. In the second part of the minute, corresponding to the period in which the respirations are the most irregular, the heart beats twenty-two times in a quarter of a minute. In this trace, as in the others, there is a moment when the cardiac diastole and the movement of inspiration are confounded.

In the third quarter of the minute, the pressure increases, and the heart is accelerated; 37 beats in the quarter, in the second half of which (one-eighth of a minute) twenty-two arterial pulsations are counted.

In the fourth quarter of the minute, the pressure continues to increase; pulse, 38; the pressure is at its maximum.

In the first half of the minute, the pressure is 132 mm. In the third part, it increases to 146 mm. In the last quarter, it attains 165 mm.

The period of the increase of pressure, with acceleration of the pulse, then relative retardation, when the pressure reaches its acme; this characteristic period, as one knows, of convulsive attacks, — for example, the convulsions produced by strychnine, — is the proof of a convulsive attack produced by iodoform.

6.35. — The animal continuing to vomit, prevents further

observations. It died the next day at nine o'clock. Before death, the heart beat 190 times per minute, and arrhythmically. (Figs. 9, 10, 11.)

EXPERIMENT IV. — A dog of eight kilograms weight, under the same conditions as in the last experiment.

Average pressure, 165 mm.; pulse, 200–204; respirations, 10.

10.15. — Ingestion of 2 grams of iodoform in meat.

1.20. — Average pressure, 170 mm.; pulse, 176; respiration, 13: all is regular.

2.00. — Average pressure, 157 mm.; pulse, 176, more energetic and full; respirations, 13, regular.

4.00. — Average pressure, 168 mm.; pulse, 182, stronger, full, with some irregularities in the first quarter of the minute especially; respirations, 14, very full and nearly regular.

6.00. — Average pressure, 168 mm.; pulse, 132; respirations, 12, little depth, feeble and regular.

The following day, 9 A.M., average pressure, 162 mm.; pulse, 158, feeble, small, regular; respirations, 41.

10.20. — Extreme slowness of respiration; very often only 5–6 respirations per minute; the respiratory movements are arrested in inspiration.

In the first quarter of the minute, twenty pulsations with about two respirations. The pulsations are full and strong: they measure upon the tracing 12 mm. in height, and 5 mm. in breadth.

In the first part of the second quarter of the trace, there are 8 pulsations similar to the preceding; but suddenly the pulse quickens, and in the second part of this quarter there are 26 pulsations. The pressure diminishes; the pulse is feeble and small. During the acceleration of the heart, the pressure diminishes to 14 mm.

This acceleration of the heart, accompanied by a fall of the pressure, continues a small part of a quarter of a minute; and shortly the pressure re-mounts to 15 cm. of mercury (maximum). Finally the heart resumes the rhythm it had at the commencement of the trace.

In the last quarter of the minute, there are nineteen pulsations, one respiration, and the average pressure is 139 mm.

Ten minutes afterward new attacks, with quickening of the pulse which continues a second only; suddenly afterward the pressure reaches 18 cm. of mercury. Respirations, eleven.

The pulsations are full, seventeen to the quarter of the minute. In the last quarter of a minute, they become somewhat intermittent. Then follows a new stage, lasting about seventeen seconds, during which the pressure does not exceed 18 cm. of mercury. This acceleration ceases, and afterward is followed by an elevation of the pressure, which returns to 21 cm. as before in the space of six seconds.

After this new fall of the pressure to 18 cm., with acceleration of the pulse for twelve seconds, follows falling of pulse, and irregularity, with return to the pressure of 21 cm. of mercury; afterward still new attacks with acceleration of the pulse, etc.

After this series of convulsive crises, accompanied by cardiac disturbances which have been described, the respirations become regular, thirteen per minute.

The pulsations become normal, 142 per minute, perfectly regular; and the average pressure remains fixed at 124 mm. (Figs. 12, 13, 14, 15.)

If we attempt to compare the action of iodoform and certain analogous substances (chloroform, chloral hydrate, bromhydric ether, etc.) upon the heart, a marked difference is found between them.

With the latter substances it is seen, in frogs, that disturbances in the movements of the heart follow; and, as with iodoform, these movements are very notably lessened.

Thus, as Vulpian has shown, if we crowd the action of anæsthetics a little, there appear various kinds of irregularities. The most common consist in rhythmic intermissions, which follow a series of two or three complete contractions of the heart or sometimes after a greater number. These intermissions are more or less long, sometimes quite prolonged.

We see, further, that each series of regular movements of the heart is terminated by a systole of the auricles, not followed by a contraction of the ventricles, or followed by a contraction of this cavity which is scarcely visible. In cer-

tain cases there are two or three auricular systoles for one series, before a ventricular systole occurs, etc.

From the study of the physiological action of iodoform upon the heart of the frog, which I have made, it is seen that these intermissions and irregularities are very rare, little marked, and cease rapidly.

But the great difference between the actions of anæsthetics and iodoform upon the heart is that observed when the heart is studied after its excision. If the heart of a frog, which shows manifest irregularities of contraction from chloroform or chloral hydrate having been administered, be excised, soon after the excision we observe a complete, and often prolonged, arrest of the heart. After this arrest, the movements commence again, and present the same characteristics, the same kind of irregularity, as before excision.

With iodoform the facts are different. If we excise a frog's heart in a state of extreme slowness of action from the effect of iodoform, the heart commences to beat again nearly as in the normal state. This pronounced difference between iodoform and chloroform, chloral hydrate, bromhydric ether, etc., shows, without question, that these latter substances act upon the intrinsic nervous apparatus of the heart; while iodoform acts, without doubt, upon the origins of the vagus nerve, sparing, to a certain extent, the muscular fibre and intrinsic cardiac ganglia.

The study of the excised heart of the frog poisoned by iodoform; the study of the action of iodoform upon the heart of this batrachian, before and after the destruction of the bulb; the study of the dog's heart, when this organ is no longer in communication with the central nervous system through the vagus, — all go to prove that the cardiac disturbances following poisoning by iodoform take place in consequence of the action of the drug upon the bulbar centre of the cardiac vagus.

I do not wish to say that iodoform has not a slight action upon the muscular fibre of the heart and upon the intrinsic cardiac ganglia; but I may say that iodoform has a preponderating action upon the origins of the vagus.

After having defined the mechanism of the action of iodo-

form upon the heart, it is necessary to answer a question of the first importance : Is iodoform a cardiac poison ?

We know, that, from the point of view of the pathological physiology of the affections of the heart, it is necessary to make a distinction between the cardiac poisons, properly so-called, and toxic substances which, with their characteristic effect, have also a certain action upon the heart. If under the name of cardiac poisons are comprehended all the substances which act on the heart, the number of these agents would apply to all medicinal and toxic substances. On the other hand, if we consider as cardiac poisons the substances which, placed directly upon the heart of the frog or in its neighborhood, disturb that organ, we would find that all the substances which act gradually upon the organism — for example, the soluble metallic salts — are cardiac poisons. It is for this reason that compounds of copper, mercury, arsenic, potash, etc., have wrongly been placed among cardiac poisons.

Those substances should be called cardiac poisons, which have an elective action upon the heart, — which act upon this organ through the intermediation of the circulation and absorption, while the other organs are little or not at all affected.

It is known, that, among the true cardiac poisons, certain ones, the type of which is digitalis, arrest the heart of the frog in ventricular systole ; that others, of which the type is muscarine, arrest it in diastole.

It is known, further, that atropine is powerless against systolic poisons, while it destroys the effect of diastolic poisons. Thus atropine causes the heart of the frog, arrested by muscarine, to beat again ; the paralyzing action of atropine being more energetic than the exciting action of muscarine.

From these facts, we see that iodoform is not a true cardiac poison, although disturbances of this organ are manifest before other functional troubles, and after the insertion of the drug under the skin of the tarsus. However, iodoform in large doses has a considerable action upon the heart. In frogs it arrests the heart in diastole, and in that

respect resembles muscarine; but as with *digitalis*, *adonis vernalis*, *convallaria maialis*, *antiaris*, etc., atropine has no action upon the heart arrested by iodoform. We may say that the stimulating action of iodoform upon the vagus is very powerful, and that the paralyzing action of atropine is not capable of destroying it.

Vulpian has said that all cardiac poisons act upon the cardiac muscle. If these poisons, he says, act by election upon the ganglia of the heart, they ought to act equally upon the ganglia of the intestines, bladder, etc. There is only a special action for special organs. The striated fibres of the heart have a distinctive structure and chemico-physical constitution: we understand, then, very well, why certain poisons act especially on them, while they spare the muscular fibres of the rest of the body. It is seen, then, that, following the reasonings of Professor Vulpian, iodoform is not a true cardiac poison; for it acts principally upon the central apparatus at the origin of the vagus.

We may say that iodoform is indirectly a cardiac poison. If it may not be rightly classed among cardiac poisons, it should be understood that it has an action upon the heart superior to that of substances of the same class known at the present time.

2. Temperature.—Iodoform is not without influence upon the temperature. This I have been able to observe upon mammals, principally dogs, to whom it had been given by the stomach.

Doses of iodoform not above 1.—1.50 do not modify, in an appreciable degree, the temperature. In some experiments I have been able to observe an elevation of five-tenths of a degree, centigrade.

With a single dose of 2.—3., the temperature, after three hours, rises from five to eight tenths. The temperature may even rise from one to one and a half degrees in twenty-four hours. This change in temperature continues for twenty-four or thirty-six hours, to return finally to the normal state. Rarely a fall of one or two degrees is observed after the commencement of the rise.

Doses of 4.—5., and above, lower the temperature in a re-

markable fashion. In some cases, the lowering of temperature is preceded by a slight transient elevation: in other cases, the fall of temperature is the only observable phenomenon. In the first twenty-four hours the temperature falls from one to two degrees; during the second and third days it falls from four to five degrees.

In one experiment, I gave to a healthy dog 6. of iodoform, the temperature in the rectum registering 39° C. Three hours after the ingestion of the drug the temperature rose to 40.2° . At the end of twenty-four hours the temperature had gradually fallen to 37° ; the following day it fell to 36° , afterward to 33.5° , in spite of the appearance of tetanus.

These facts show, that iodoform in moderate doses excites the centres of calorification; in very large doses, it depresses the same centres; that it may or may not at first produce a slight increase of heat.

3. Action on the Nervous System.—In the frog, iodoform determines two kinds of phenomena.

In the first period we observe symptoms of depression, and in a second period symptoms of excitation. Some minutes after the insertion, under the skin of the posterior foot, of .03 to .04 of a gram of powdered iodoform, we notice a light circumscribed hyperæmia where the drug has been introduced.

After the local application of iodoform under the muscles, the electro-muscular contractility diminishes; and at the end of a certain time, if the amount of the drug is great, we see the nearly complete loss of this contractility.

If the iodoform is applied directly to a nerve,—as the sciatic, for example,—we see that the excitability diminishes, and the nervous cord may become entirely inexcitable to electric or chemical stimuli.

A certain time after the ingestion of the drug, from one-half an hour to one hour, the general phenomena commence to show themselves.

The animal is less active, leaps with difficulty, and swims slowly; but he is still able to change from a dorsal decubitus to a normal position.

When we electrify the spinal cord and the peripheral

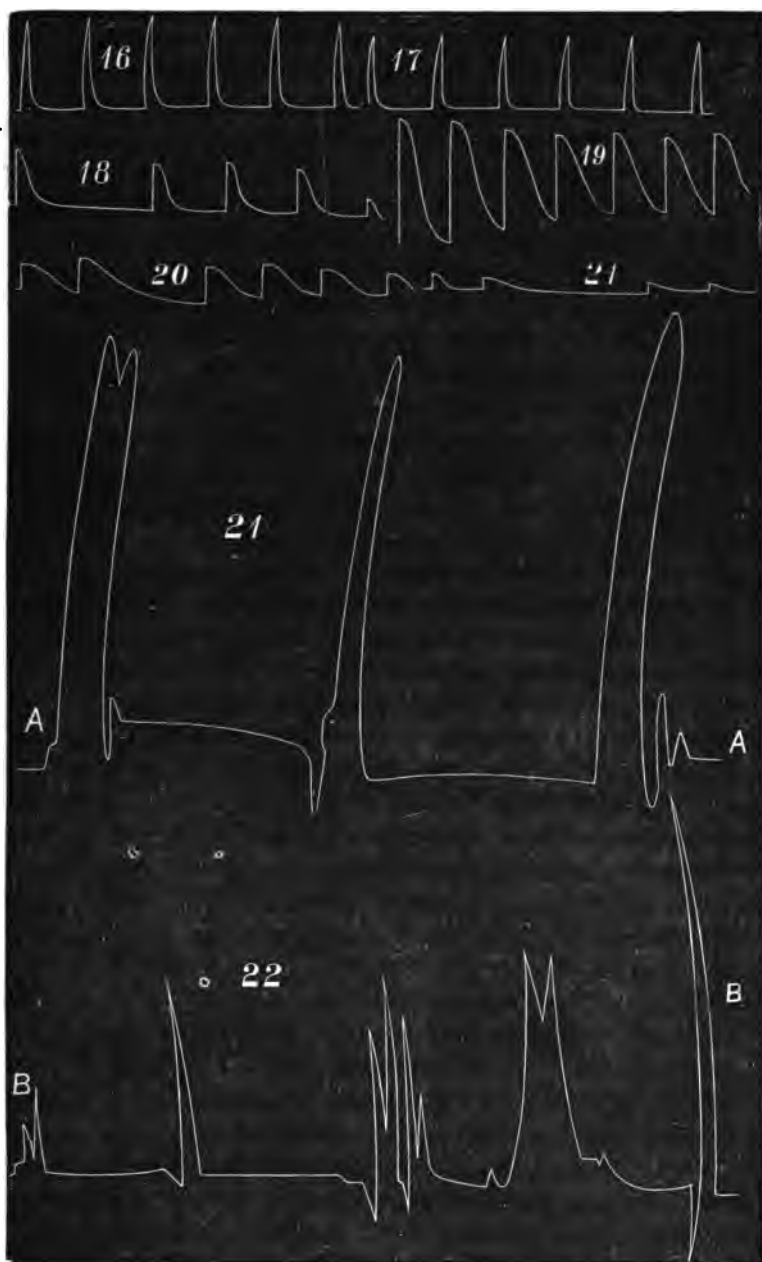


FIG. 16. Normal frog's myogram. 17. Trace one hour and fifty-five minutes after the insertion under the skin of .07 of iodoform. 18. Trace after two hours and fifty-five minutes. 19. Trace ten minutes after the subcutaneous insertion of .20 iodoform. 20. Seven minutes later. 21. Twenty-two minutes later. 22. Normal trace of movements of the hind paw, produced by faradizing the sigmoid gyrus in the dog 23. The same after poisoning by iodoform.

end of the sciatic, we do not perceive a diminution of the excitability.

The muscular irritability is intact. When the motor disturbances commence, the sensibility is nearly preserved. The reflex movements are produced in the limbs, when they are excited.

The weakness is progressive. The leaps are more labored. The hind-legs do not regain their normal position with the same quickness when they are extended; then the gait may become like that of a toad.

If the poison has been introduced under the skin of the hind-legs, these become more quickly weakened. At this moment, if we expose the sciatic nerve, and electrify it by means of a galvanic forceps of Pulvermacher, there are induced very evident movements of the leg and foot of the corresponding side; but these movements are less feeble than those induced by the same means in a healthy frog. We notice further, in exciting directly the muscles of the leg or thigh, that the muscular irritability is stronger than that of the nerves.

Immediately the animal becomes more torpid: he neither leaps nor swims. If he is placed on his back, he makes efforts which are not sufficient to change his position. But, if he is excited by a strong electric current, he can still execute spontaneous movements. Finally the animal becomes entirely inert, or can with difficulty perform certain feeble spontaneous contractions. The sensibility diminishes in a less degree than the mobility; that is to say, the sensibility is not abolished, but the loss of motor power is already considerable. Even in the period of inertia, and a long time after it has commenced, appear reflex movements still at times produced, quite limited,—when the animal is submitted to a sufficient excitation; when we turn the frog suddenly on its back, for example; when we incise the skin and sternum to expose the heart; when we pinch strongly for several seconds one of the limbs, etc.

In these conditions, if we examine the state of the nerves and muscles, it is seen that the motor power and irritability are little changed. It is a long time after the complete loss

of voluntary motor power, and following the employment of large doses of the drug, that the nervo-muscular excitability is lost. Then we no longer obtain—or obtain only very feebly—muscular contractions, in galvanizing the sciatic nerve. The direct galvanization of the muscles produces only extremely feeble contractions.

It is necessary to remark, that the excitability of the nerves is more marked than the muscular irritability, and that the motor disturbances are more pronounced than those of sensibility. Be it as it may, I am assured that the diminution of the sensibility exists in the iodoformized frog; for if, before the insertion of the iodoform, the iliac artery is tied, after the poisoning it is necessary to apply a strong current on the head of the animal to cause a contraction of the leg of which the artery has been ligated.

It is further still necessary to remark, that the number of cardiac contractions has already diminished a half, and more, when the first general nervous disturbances appear.

After a state of motor paralysis and of sensory paresis, follows a period entirely opposite. In the limb where the iodoform has been inserted, appears a contracture which gradually invades the rest of the body.

A moment now comes when the animal is immobile, rigid, the posterior legs in forced extension; the anterior legs rigid, pressed against the trunk; the muscles of the abdomen and chest are very contracted. Ordinarily there is opisthotonos; and, in the muscles which are in tonic contraction, are noticed muscular trembling or localized contractures, now here, now there, at times causing a limb to move, at times the side of the abdomen or chest. The reflex excitability is augmented, but it does not equal that seen in poisoning by strychnine.

The general muscular rigidity continues after section of the cervical cord. If all the nerves of the posterior limbs are cut, the contracture diminishes and finally ceases in the injected limb, later in the other.

The animal dies in a state of complete rigidity.

In mammals, the general nervous disturbances take place when the iodoform has been injected into the stomach or

peritoneal cavity, and after prolonged inhalations with an appropriate apparatus which I have described above.

If the iodoform is placed under the skin, or is applied upon the denuded dermis, on account of its feeble solubility and of the limited extent of the surface of absorption the iodoform produces only a local anæsthesia and few general disturbances.

If we give to a vigorous dog, by the stomach, 3.-4. of iodoform, or more, a train of symptoms appear which may be divided into three periods.

First Period.—Profound sleep. A tendency to fly from light and noise, and to hide in a corner (these phenomena are little marked in the rabbit and guinea-pig); general weakness, general anæsthesia in a small degree, superficial and tendon reflexes little diminished; pupils contracted at first, but re-acting to light.

The animal moves when aroused by a loud noise near him, or when shaken.

He turns in a circle, first to one side, then to the other, and strikes against obstacles found in his way. He stops, then lies down, and sleeps.

In this period the excitability of the so-called cortical motor region of the brain is lessened.

To prove it, the motor region of the brain of vigorous dogs is exposed. The excitation of the cerebral surface is made by means of a faradic current (Gaiffe's modification of Siemens and Halske's apparatus, operated by a so-called Grenet-cell). The intensity of this cell could not be measured with the apparatus I had at my disposal to estimate milliamperes. This apparatus would not measure more than fifty milliamperes, while the faradic current employed was incomparably more energetic.

The movements of the limbs determined by the faradic excitation of the cortical motor zone were at once registered. For example, the exact point of the gyrus whose faradization produced movements of the left hind-leg should be the tip of the right gyrus. After the administration of 4. of iodoform, and when the animal has been poisoned, traces of the movements of the extremity are again taken under the same conditions.

Trace A, Fig. 21, represents movements of the paw before poisoning. The movements are extensive, and last an appreciable time.

Trace B represents the same movements after poisoning. The movements are then less extensive, and cease immediately.

Second Period. — Spasmodic paraplegia: the two fore-legs are contractured so that movements of flexion are impossible. The animal stands upon his claws on the least effort he makes to walk, and at the same time he crosses his paws. The hind-legs are spread apart so as to widen the base of support. Trembling follows voluntary movements; exaggeration of the tendon reflexes; spontaneous and provoked trepidation; general sensibility little altered; intelligence preserved; pupils slightly dilated; almost persistent priapism with preputial oedema in many experiments.

Later, impossibility of standing on all-fours. The animal can support himself on the fore-legs while he drags the hind-legs after him: on attempting to make him walk by dragging him by the collar, he backs, always dragging the hind-legs and throwing the head backwards.

Third Period. — The phenomenon which characterizes the commencement of the third period consists of loud repeated cries; immediately intense and general tetanic contractions occur (opisthitonos; less often, orthotonos and pleurosthotonos). Reflex excitability is increased; for visual auditory electrical, mechanical, and thermic excitations, increase the tetanic contractions.

In the midst of the tonic contractions, at long intervals some tonic convulsions appear chiefly in the fore-legs.

In this period the animal has a tendency to rotate about his long axis, and also a tendency to turn somersaults; respiration is difficult, pupils dilated.

Death takes place during a violent convulsion, in spite of artificial respiration.

Transverse section of the cervical cord, artificial respiration being established, has no influence upon the tonic contractions.

Sleep, whether natural, from ether or chloroform, diminishes, but does not dispel, the tonic contractions.

After having narrated the general phenomena of iodoform poisoning, we should seek to point out the physiological explanation of these phenomena. When we examine the development of iodoform poisoning in the frog, it is clear that this toxic substance acts directly upon the nervous centres because of the nervous excitability and muscular contractility. In reality, the previous ligation of the iliac artery, or of the whole of the posterior part of the frog's body except the lumbocentral nerves, does not prevent paralysis from appearing in the legs.

Thus the changes produced by iodoform come from a weakening of the functional power of the nervous centres.

After the weakening of voluntary movements, comes on a certain degree of paresis of sensibility; and, when these phenomena have been present some time, there appears a diminution of the excitability of nerves and of muscular contractility.

Among mammals, the phenomena of the first period of iodoform poisoning (sleep, especially in the dog, weakness of voluntary movements, diminished general sensibility, more marked with inhalations of the drug, etc.), demonstrate that iodoform in these animals affects the nervous centres by weakening their functional attributes.

After this period of paresis, of anæsthesia and diminished reflexes, followed by a diminution of the excitability of the nerves, and muscular contractility, there follows the second period, in which an active excitation of the nervous centres is produced, and batrachians and mammals die, in most cases in a state of contracture.

We see that iodoform is far from being an anæsthetic like chloroform or bromoform: it is especially a paralyzer of the central nervous system. We should not say that iodoform causes tetanic convulsions, because it is a convulsant like strychnine.

Iodoform, having caused tetanic convulsions, produces paralysis; and in a certain number of dogs I have noticed that this state of irritation of the cord is not essential, for death takes place from general paralysis.

The convulsant action of iodoform may be attributed to a

physical excitation of the nervous system by the great quantity of the drug which circulates in the organism, for the convulsive period in mammals is produced by large doses. It is the same with cinchonine, cinchonidine, and other substances classed without good reason, by some experimenters, among convulsant agents.

4. Digestive Apparatus.—If we give to a dog 1.-1.50 of iodoform at a single dose, or .30.-.40 during several consecutive days, remarkable gastro-intestinal disturbances are wanting. The animal eats well, does not vomit, but drinks water with avidity. Stools are more abundant, and fluid; they often contain intestinal worms, especially those which immediately follow the ingestion of the drug.

If the iodoform is given in single doses of 2.-3. or 1. daily for several days, the dogs often refuse solid food, but accept liquid food,—milk, for example. Sometimes they vomit. During the day many liquid evacuations take place, of a bright yellow color; sometimes, but rarely, they contain mucus and a little blood.

In doses of 4.-5. and upwards, the animals at the end of the first day refuse food; they vomit often during the day; they are thirsty, but their stomach retains nothing. The stools become frequent, and similar to those of dysentery.

If 1.-1.50 is given for many days, the animal becomes stupid, sleeps much, and eats nothing; drinks water and milk. Marked rapid emaciation accompanies this train of symptoms.

Eyelids are glued by a viscid secretion; a thick mucus runs from the nose, and finally stops it up; cough commences; a vesicular eruption appears on the abdomen, especially near the inguinal folds. In a word, we see iodic intoxication. The animal dies in complete organic prostration; and the autopsy often reveals characteristic lesions of broncho-pneumonia, or lobular pneumonia.

It should be stated, that all gastro-intestinal and nutritive disturbances do not take place only when the iodoform is ingested by the mouth. They occur, but to a less extent, when the substance in solution is injected into the peritoneal cavity. Medium doses produce gastro-intestinal

trouble without locally irritating the mucous membrane. In many autopsies there exists simply a slight duodenal hyperæmia, with an abundance of mucus in the intestine.

5. **The Secretions.**—In my first experiments on dogs, I noted that the animal, during the twenty-four hours following the intra-peritoneal injection and ingestion into the stomach of iodoform, micturated frequently. Salivation took place; stools were abundant and diarrhœal.

In my own case, and that of my patients, the absorption of 2. of iodoform in twenty-four hours caused a marked increase in the urine.

To study the action of iodoform upon the different secretions, I have used iodoform by ingestion into the stomach, and by intra-peritoneal and hypodermic injections of a solution of .50 of iodoform in 3.50 of ether.

In all experiments, as soon as the re-action of iodine appeared in the submaxillary saliva, the secretions became quickly augmented: the bile and submaxillary saliva were trebled in amount.

Iodoform by the mouth or peritoneum shows its re-action in the saliva in an hour and a half; its ethereal solution, hypodermically, appears after ten to twenty minutes.

Submaxillary saliva and bile are first increased, the urine next, and parotid saliva and pancreatic juice later.

These hypersecretions last forty minutes, gradually diminishing.

All the secretions have their normal qualities, except the bile, which is less ropy, thick, and colored. Tracheal mucus is often increased, as is also the bronchial, nasal, and conjunctival.

6. **Mode of Absorption: Transformation and Elimination.**—Minute traces of iodoform are absorbed from external application. It is easily absorbed by the skin deprived of its epidermis. It is absorbed by inhalation, hypodermic injection, dissolved in ether, alcohol, and oil. It is specially absorbed by the stomach and peritoneum.

Authors disagree about the form under which iodoform is absorbed, and circulated among the tissues. Most think that it acts by the great quantity of iodine which it sets free. I

am convinced that most of the symptoms are produced by iodoform itself.

To one dog I gave 5. of iodoform, and to another 5. of iodide of potash; and noted all the phenomena which have been described above in the dog which took iodoform, while the dog which took potash vomited.

Again, its elimination unchanged by the respiratory tract confirms my view.

It appears as the iodide of sodium in the urine. When administered in very great quantity, an iodate appears in the urine. In order to detect the iodate, add starch-water, and one or two drops of sulphurous acid recently prepared and chemically pure: the starch turns violet blue.

If the urine contains iodoform, ether dissolves it. The urine should be decanted and evaporated slowly at a moderate temperature.

Crystals of iodoform may then be discovered with the microscope.

Twelve hours after doses of 4-6., albumen appears in traces, or quantities of 4-5. per litre of urine. Heat and potash show the presence of much hæmatine; the urine is more or less red in color, and this increases on exposure to the air. Under the microscope, red blood-globules more or less altered, hæmaglobine, fatty degenerated epithelium, lymphoid corpuscles, cylindrical epithelium, appear.

When albumen appears in the urine, iodic elimination stops, and toxic symptoms are aggravated.

Before the operation for nephrotomy, if one finds the elimination of iodide defective it should constitute a contra-indication, for it demonstrates that both kidneys are altered.

The other conclusion is, that, in diffuse renal affections, it is necessary to avoid strong and poisonous drugs; for their accumulation in the organism may place the patient's life in danger.

The albuminuria produced by large doses of iodoform is, in my opinion, caused chiefly by the elimination of the iodate, which acts as a very irritating substance upon the renal tissue. It is probable, further, that at first the albumen eliminated by the kidneys is due to an alteration of

the blood by iodoform and its derivatives. The three noteworthy experiments of Professor Semmola of Naples, upon albuminuria, support this opinion.

It is known that doses of 5.-6. of iodide of potassium or of sodium do not produce albuminuria.

It is known that these drugs appear quickly in the secretions, — saliva, urine, bile, milk, etc., — and the elimination is complete after twenty-four hours. It is not the same with iodoform.

In experiments made upon myself, and upon others who frequent the laboratory of Vulpian, I was able to note the presence of traces of the iodide in the urine an hour after the ingestion of iodoform.

The same phenomena have been observed in animals with salivary and urinary fistulæ, etc.

Iodoform, especially in the form of the iodide, is eliminated slowly ; and one may recognize it in the urine three days after its ingestion.

7. Experimental Anatomical Alterations.—The alterations in the organs, brought about in consequence of the experimental poisoning by iodoform, are very interesting, and, to a certain point, are comparable to alterations due to phosphorus, and described by several authors, among whom may be mentioned, especially, Professors Cornil and Brault, and Danillo of St. Petersburg.

The study of the changes produced by iodoform is the more interesting, as the brief facts furnished recently upon the fatty degeneration of the organs are the only ones recognized.

In studying methodically the evolution and histological alterations, I have finished the theories of the fatty degeneration produced by iodoform, and have described lesions of the brain, cord, and a particular lesion of the kidneys. For this study, I have chosen the guinea-pig, rabbit, but more often the dog.

a. Macroscopic Examination.—On opening the cadaver of an animal poisoned by iodoform, one is struck by the characteristic odor of this substance, which is exhaled as soon as the scalpel enters.

Heart in systole, nothing upon the visceral pericardium; subendocardial ecchymoses upon the pillars of the left ventricle, nothing upon those of the right. Heart empty, or containing very little blood in the ventricles. Lungs are seen emphysematous to a greater or less degree.

In several animals slowly poisoned, inflammation of the bronchi, œdema, and hyperæmia of the lungs are seen. In some cases, traces of more or less diffuse broncho-pneumonia were seen. In very severe cases of poisoning, one may see hæmorrhagic infarctions more often at the bases than at the apices.

When moderate doses (2. to dogs) have been introduced into the gastro-intestinal tract, no important changes are noted. The mucous membrane is not hyperæmic, except in the duodenal region; in the whole length of intestine is found a large amount of mucus.

Large doses (5.-6. to dogs) produce hyperæmia of the stomach and intestines, either in disseminated plaques or in longitudinal lines.

The stomach contains a dark yellowish liquid, and the intestines a muco-diarrhoeal fluid.

The liver is yellowish, the spleen exsanguinated with central ecchymoses. The kidneys are much congested: in some cases, they are very large. On section, the cortical substance is found pale, and the medullary, hyperæmic; congestion of the whole extent of the cerebral pia mater; hyperæmia of the gray substance of the brain, bulb, and cord. The gray substance of the cord is softened: its color is dark red. After large doses, hyperæmia of the white substance is also noted, especially of the brain, with small ecchymotic points in the cerebral gray substance.

In trephined animals, I have studied the state of the cerebral vessels after the administration of iodoform, and have been able to determine that the hyperæmia commences as soon as the animal yields to sleep, and that it is most marked in the period of tetanic convulsions.

b. Microscopic Examination. — In studying the histological alterations of the viscera, I employed as hardening agent a one-per-cent solution of osmic acid.

The fragments of the different organs left in osmic-acid solution for twelve or twenty-four hours should be thirty to fifty cubic millimetres in size, so that the liquid can easily penetrate them.

On removing the fragments from the osmic acid, they are to be placed in distilled water for half an hour, after that kept in alcohol.

To appreciate the alterations, the animals should be given sufficient doses of the drug, and should be killed in one, two, three, or more days after the poisoning.

The liver is one of the first organs attacked after its administration by the mouth or in the peritoneal cavity.

In all periods, I have determined the following lesions: The hepatic cells lose their irregular polyhedral form, and appear dilated, vesicular: they contain a semi-liquid substance, very granular, with a vesicular nucleus. Around the interlobular ramifications of the portal vein, there are seen small black granules, which are fat, colored by osmic acid.

In a more advanced state, the hepatic cells which surround the portal vessels contain fatty granules.

In a still more advanced state, all the cells of the hepatic lobule present fatty granules; but the peripheral cells contain many more of these granules than the cells of the centre of the lobule. Examination of sections of the liver does not show signs of inflammation. The portal vessels are dilated, and often contain fatty granules. The biliary canaliculi are not altered: only the epithelium in some places approaches fatty degeneration.

The epithelium of the stomach, intestines, and gastrointestinal glands, has undergone the same degeneration.

The heart and muscles have not escaped the fatty alteration. The intermuscular and interfibrillar connective tissue is invaded by fatty granules. The muscular fibre itself is granular. One sees no traces of inflammation in the perimysium or in the sarcolemma. The kidneys are much altered. In slow poisoning, one may determine fatty degeneration of the epithelium of the uriniferous tubules, and of the endothelial cells of the vessels.

But the alteration I wish especially to point out is the inflammation of the kidney which follows the ingestion of large doses of iodoform. The most important point to study is the glomerulus.

The vascular tuft is especially attacked. The capsule of Bowmann may retain for a certain time a nearly perfect integrity. The capillaries of the glomerulus are strongly congested and dilated. The nuclei of the perivascular layer are multiplied.

The tension in the vessels of the glomerulus is increased, and bloody serum passes through their walls.

In the empty space between the vascular tuft and the capsule, there occurs a pouring-out of liquid or an exudation more or less abundant, forming zones of various contours, which surround the vascular tuft.

In some glomeruli, the exudation is very abundant, and crowds the vessels to one side of the cavity.

There is no exudation at the level of the opening of the glomerulus, for there is not space enough between the capsule and the afferent vessels.

In the liquid poured out about the glomerulus, there are yellowish granules originating from the blood, and probably due to the destruction of the red globules. There are seen further a great number of lymphatic cells, and some red globules emigrated through the walls of the vessels of the glomerulus.

When the capsule of Bowmann is inflamed, the lining cells are deformed: they swell, become spherical, detach themselves from the wall, and fall into the cavity of the glomerulus.

The collecting tubules, strongly dilated, present at their periphery traces of primitive epithelium: only the cells are scarcely visible, and drowned in an abundant exudation, in the middle of which are clearly distinguished nuclei strongly colored red.

In the middle of these tubes, at numerous points, are recognized fibrinous cylinders. Sometimes this exudation reaches the periphery by means of membranous prolongations.

In the medullary region, the uriniferous tubules show more plainly their epithelium, although the contour of the cells is not very distinct. That which characterizes this region is the disposition of the inter-lobular vessels, which are gorged with blood, and become varicose at certain points. There are, further, small points of extravasation in the mass of the tissue.

I have examined the changes in the cord and brain produced by acute poisoning with large doses of iodoform, — either after death in the fresh state, according to Ranvier's method, or after hardening in bichromate of ammonia, then in chromic acid, and finally transported to alcohol. I obtained very thin sections with the large microtome of Thomas. Stainings were made with carmine, chloride of palladium, hæmatoxylin, etc.

In the majority of cases, the most important alterations are limited to the gray substance. In the white substance of the nervous centres, we see especially dilatation of the vessels, with a small escape of red globules.

In different degrees, there are seen alterations in the whole length of the gray substance of the cord and bulb; but the most advanced lesions are met with in the dorso-lumbar region of the cord. It occurs, quite frequently, that one half of the gray substance is more altered than the other, and the most marked lesions are seated in the anterior horns.

The vessels are dilated, and gorged with blood; in the perivascular lymphatic sheath is seen a bloody exudation, and a large number of extravasations of blood from ruptured vessels. In the anterior horns are small cells of new formation.

But the most important fact is the alteration in volume of the multipolar ganglion cells of the anterior horns.

They diminish in volume, and lose their normal form. Their nuclei become less visible; they take carmine poorly, and rapidly lose their nucleoli. In the most advanced state, the nuclei have disappeared; the cells are shrivelled, and changed into small piriform or ovoid bodies. They lose their prolongations.

In certain places the large cells are destroyed; and in others, on the contrary, they are nearly preserved.

The axis-cylinders, and the myeline sheath of the nervous fibres, are not notably altered in acute poisoning by iodoform; and rarely I have been able to show in the elements some granular bodies.

Let us study now the alterations in the cord after the ingestion of moderate doses of iodoform, repeated every hour. The same lesions in the vessels and nervous cells have been met with in the gray substance of the brain, especially the so-called psycho-motor region.

After the analysis of the blood of animals submitted to iodoform poisoning, there is a diminution of the red globules, and an alteration of their form (raspberry appearance).

Whence comes the fat in the organs? Voit and Pettenkoffer, from experiments on dogs and cows, conclude that fat is formed from albumen in the normal state. Bauer says, that, in phosphorus poisoning, the fat comes from the albumen in the circulation, stationary in the organs, and from the degeneration of the cells of the organs. Hoppe-Seyler, Ludwig, Siber, Schutzenberger, and Halsiwetz do not accept the theory of Voit and Pettenkoffer.

My friend M. Alexander Lebedeff, in Pflüger's *Archives*, has published an interesting article on this subject.

He starves dogs for some weeks to deprive them of natural fat. Then he feeds the animal on mutton tallow, linseed and olive oil; and after a certain time, on killing the animal, he finds the fat the animal has acquired is precisely identical to that administered, not at all like the animal's natural fat. Hence he concludes that the fat comes from the fat ingested.

After having substituted linseed-oil for the normal fat of the dog, he gives phosphorus. By a careful analysis he proves that in the hepatic cells, instead of normal fat, he finds linseed-oil.

He concludes that hepatic fat comes from the subcutaneous cellular tissue. Because of a special action of phosphorus on the red blood-globules, the oxidation becomes

incomplete; and the albuminoids, especially fat, are not consumed, and are deposited in the organs.

As to the source of fat in iodoform poisoning, I am inclined to the theory of fatty infiltration. There is an accumulation of small fatty granules in the portal vessels. Also the cells surrounding the vessels are invaded first, and this I consider a strong argument that the fat is brought to the liver.

8. Antiseptic and Anti-fermentative Properties of Iodoform and the Iodate of Soda. — In a communication to the Academy of Sciences, I have said that simple iodoform does not stop the development of bacteria already commenced in putrid liquids, but it is more powerful to prevent the formation of these elements.

I have always experimented with bacteria of the same origin and age, — the micro-bacteria of putrefaction (*bacterium putridinis*).

The nutrient fluid has been, distilled water, 100 cc.; crystallized sugar, 8.; phosphate of potash, 60.; tartrate of ammonia, 120.¹ 20 cc. of the sterilized fluid is put in each flask of Pasteur. These flasks, previously superheated, are exposed to a temperature of 36° C.

The absence of germs in the flasks after fifteen days being proved, 20 cc. of different solutions of iodoform are introduced.

Five drops of a bacterian fluid, or small bits of fresh frog's muscle, are put in each flask.

Knowing that iodoform is partly transformed, in the organism, into the soluble iodate of soda, I have used that with the following result:—

Having placed 200 cc. of fresh urine in three glasses exposed to the air, I have found that .5 of iodate of soda does not prevent its fermentation, but 1. does.

The iodate has powerful antiseptic properties. If the urine becomes in a few minutes a little dark, it is from oxidation of its coloring matters.

Iodoform dissolved in oil of turpentine prevents the putrefactive process, but perhaps here the turpentine is an active

¹ *Comptes rendus de la Soc. de Biol.*, 1882.

factor. Antiseptic experiments with iodoform itself are difficult, because of its insolubility in water.

A piece of meat kept fresh for three months covered with collodion containing iodoform, but the protective power of the collodion must be considered. Vulpian says tadpoles develop normally in iodoform water.

Used as a dressing for wounds, it is under different conditions than in the flasks of culture; for it is dissolved by the secretions of the wound, and the oil, and thus becomes a more active antiseptic: although some say that it is simply by its protective power that iodoform does good. The following table contains the results of experiments performed with the iodate of soda:—

FLASKS.	NUMBERS.								
	1	2	3	4	5	6	7	8	9
Strength of solution, per cent . .	0.5	0.4	0.3	0.2	0.1	0.05	0.03	0	0
After 24 hours the liquid remains .	Clear.	Clear.	Doubtful.	Doubtful.	Turbid.	Turbid.	Milky.	4 gtt. of bacterian fluid. Milky.	Bit of muscle. Milky.
Last day of observation it is . .	Clear.	Clear with sediment.	Clear with sediment.	Milky.	Milky.	Milky.	Milky with sediment.	Milky with sediment.	Milky with sediment.
This last day is the .	45th.	30th.	20th.	15th.	15th.	15th.	15th.	15th.	15th.

Thus a 5 : 1,000 solution is necessary to prevent the appearance of bacteria. A solution ten times stronger is necessary to kill germs developed and actively propagating.

CONCLUSIONS.

I. The toxic dose of iodoform for medium-sized frogs is .02.

Doses, toxic in two or three days to medium-sized guinea-pigs, when swallowed or injected into the peritoneal cavity, are from 1.50-2.

2.50-2.75 kills a rabbit of from 2000.-2300., in two or three days.

A dog of 10 kilos. will die in two or three days from a dose of 4.

II. In the frog, the most noteworthy phenomenon is the slowing of the ventricular contractions, which stop in diastole. Injections of iodoform increase to a certain point the force of the ventricular systole, and they are always regular and ample: very rarely there is a short, irregular, arrhythmic period following large doses. The cardiac disturbance appears before every other functional trouble.

When the pulse becomes slow, the ventricular systole is lengthened, and the diastolic pause is prolonged, as in poisoning by veratrine. Atropine does not alter the slowing produced by iodoform. If the slow-beating heart be cut out, the beat becomes more rapid, but not normal. Iodoform does not act on a frog's heart when the medulla is broken up.

During the early absorption of iodoform, the interdigital capillaries dilate; but a progressive contraction succeeds this.

Large doses cause an acceleration, then a slowing, and at last a stoppage, of respiration. In mammals there is also a slowing of the pulse. In the dog, doses of .30-1. slow the heart, and raise the arterial tension, without causing weakening or irregularity of the ventricular contractions. With 2-4 and more, there is a progressive slowing of the pulse, with a lowering of intra-carotid pressure of about 10 cm. of mercury. In five hours there is a gradual return of the tension to the normal, and an increase of pressure.

Larger doses, after slowing the pulse, soon cause a quickening and irregularity. There are also increase and irregularity of the respiratory movements, and ups and downs of the pulse, and pressure accompanying the convulsive movements.

All these phenomena are wanting after section of the pneumogastrics.

III. Doses of 1.-1.50 in dogs seem to have no effect on heat production. Doses of 2.-3. raise the temperature 1°-1.5°C. Doses of 4.-5. lower the temperature 4°-5°C.

IV. Iodoform acts on the nervous centres, and secondarily on the nerves and muscles. In the first stage it has a depressant influence on the anatomical elements of the nervous centres, without acting on the peripheral nerves or muscles.

It causes first a diminution; and later a complete abolition, of voluntary motion (especially in frogs); at the same time producing slight anæsthesia and diminished reflexes. Finally there comes failure of the excitability of nerves and of muscular contractility.

In a second period it exaggerates, by physical excitation, the nervous centres, and produces contracture and tonic convulsions.

V. In the dog, 1.-1.50 of iodoform produces no marked gastro-intestinal disturbance; 2.-3. cause some digestive disturbance; and 4.-5. produce vomiting, anorexia, diarrhœal and dysenteric stools.

VI. Iodoform at the start increases the secretions, especially the salivary, biliary, and gastro-intestinal.

VII. Iodoform, in the form of an alkaline iodide (sodium) is eliminated by all the secretory apparatuses, and in small quantities under its own form, by the breath. In the urine a small quantity appears as the iodate. Large doses cause albuminaria and hematuria: they check also the elimination of the iodide. Iodoform, in the form of an iodide, begins to be eliminated one hour after ingestion into the stomach.

VIII. The most important alterations caused by iodoform are, fatty degeneration of all organs, especially the liver; glomerulo-nephritis and acute poliomyelitis anterior.

IX. Iodoform is more powerful to stop the development of bacteria than to check their propagation. Iodate of soda, and iodoform, dissolved in oil of turpentine, kill the microbes in full development. (*Arch. de Physiol. Norm. et Path.*, Aug. 15 and Oct. 1, 1883.)

Iodoform.—Hofmakl, at the conclusion of a paper on the surgical uses of iodoform, draws the following conclusions:—

1. Iodoform is an excellent disinfectant, and, as a rule, is a painless application to wounds.
2. On account of its slight solubility, it is of little value in complicated wounds of cavities.
3. It does not prevent the occasional outbreak of erysipelas.

4. It is not a specific against scrofulous or tuberculous processes, and develops its healing properties most notably in ulcerous processes.

5. By keeping wounds fresh and clean, it furthers granulation, though it has but little influence on the final cicatrization of the wound.

6. Very thin layers of powdered iodoform do not hinder union by first intention.

7. In pharyngeal and laryngeal diphtheria of children, iodoform does not give much better results than other antiseptics.

8. In wounds and ulcers of the mouth, rectum, and vagina, as well as in open, easily accessible wounds in the cavities of bones, iodoform, in the form of a thirty to fifty per cent iodoform gauze, is an excellent antiseptic dressing.

9. Parenchymatous injections of iodoform generally cause a great deal of pain, and it cannot be said that they give very excellent results in fungous diseases of joints and glandular swellings.

10. Iodoform ointments and plasters are often of good service in parenchymatous goitres, and chronic swellings of glands, joints, and tendons.

11. Iodoform in large quantities is undoubtedly dangerous, and is more productive of good results and less hurtful in small doses.

12. Childhood is not a contra-indication for the use of iodoform.

13. The preliminary cleansing of fresh wounds with weak carbolized water before using the iodoform dressing is of no advantage, so far as Hofmaki's experience goes.

14. The healing of scrofulous and tuberculous sores by iodoform does not prevent their return.

15. Iodoform is an excellent means for the thorough removal of disagreeable odors of neoplasm which do not admit of operation.

16. The occasional syringing of suppurating cavities with small quantities of iodoform emulsion will often have a favorable action on the quality and quantity of the pus.

17. The introduction of iodoform bougies into the urethra and bladder will often alleviate pain, as also in vesical tenes-

mus and suppurative conditions of the bladder, and will exert a favorable influence on those conditions of the urine in which rapid decomposition takes place.

18. The application of iodoform bougies to long fistulæ of the soft parts is more hurtful than useful, as the fistulæ are only stopped up, and the products of decomposition are not discharged. Equally unwise is the filling-up of the mouth of a fistula with dry powdered iodoform. (*Medizin. Jahrb.*, 1883, Heft ii. ; *Am. Four. Med. Sci.*, October, 1883.)

Semmola,¹ Rummo, Ciaramelli, and Bufalini have prescribed iodoform in chronic affections of the respiratory tract. Semmola gives it by the stomach, thinking that it is eliminated by the respiratory apparatus. At any rate, so given, the expectoration and fever diminish, the cough is less fatiguing, and the general condition improves.

Rummo gives inhalations of iodoform vapor, and also a spray of a four-per-cent solution in spirits of turpentine. He thinks the turpentine increases the action of the iodoform ; while the latter, by its anæsthetic qualities, reduces the irritant qualities of the turpentine to a minimum, and renders it easily inhaled. In this way, .20-1. of iodoform is given three times a day, with the following results :—

1. Diminution in the attacks of cough.
2. Great diminution in expectoration.
3. Less extensive râles, and a less harsh and stronger respiratory murmur.
4. After an inhalation, the patients become more tranquil, and often sleep.
5. The temperature falls, sometimes to normal.
6. The quantity of urea varies with the fever.
7. The weight increases.
8. The sweats diminish.
9. Attacks of dyspnœa occur less often.

Rummo thinks the iodoform acts as an anæsthetic on the sensory terminations of the pneumo-gastric, as a local alterative and desiccant, and as an antiseptic.

He finds iodine in the urine. (*Gaz. Méd. de Paris*, Feb. 24, 1883.)

¹ Communicated at the International Congress at Amsterdam, 1882.

Vossius recommends iodoform in all ulcerative processes of the cornea, especially in *ulcus serpens*. The earlier the case applies for treatment, the more rapid and favorable is the effect. Its use is not contra-indicated by any complications of the iris. He also advises its use as an antiseptic in all superficial, and deep accidental and artificial, wounds of the sclera. He has but rarely noticed any evil effects from its use, and never any abscess of the conjunctiva; nor has he ever met with the amblyopia spoken of by Hirschberg, and attributed by the latter to the use of the drug. (*Archiv für Ophthalmologie*, xxix. 1; *N. Y. Med. Jour.*, Nov. 10, 1883.)

The Constitutional Effects of Iodoform used as a Surgical Dressing.—König gives (*Centralbl. für Chir.*, Nos. 7, 8, 17, and 22) clinical details of forty-eight cases of poisoning by iodoform used as a surgical dressing, of which the following is a summary, somewhat condensed:—

“1. While, in the great majority of cases, iodoform produces no other symptom than very rapid, secretionless, and aseptic healing, there occurs in a certain proportion of cases general disturbance, which may be slight, or severe and even fatal. The disturbance consists in morbid alterations in the action of the brain and heart; and, as a rule, the cardiac symptoms predominate. The more severe forms are the following: (a) After sudden increase in frequency of the pulse, with diminution of its strength, there occur sleeplessness, great restlessness, delirium, hallucinations, delusions, incoherence, melancholia, refusal of food. These symptoms may quickly pass away, or may persist for weeks, and then still end in recovery, or in death from cardiac or respiratory failure. (b) After a brief stage of excitement, there occur symptoms of general cerebral paralysis under the form of acute meningo-encephalitis. This is the most severe form of all, and usually terminates fatally. In both these forms, autopsy discloses fatty degeneration of the heart, kidneys, and liver, while the brain may be normal, or show œdema of the pia mater or chronic lepto-meningitis.

“2. Iodoform intoxication is least often seen in children;

the tendency to it increases with age. Healthy youths or adults seldom suffer; and those who do suffer are usually such as are debilitated, or have the heart's action weakened for the time, as by bleeding or long illness. The susceptibility to poisoning, the liability to the severer forms, and the danger to life, increase with age.

"3. It is not yet possible to state a minimum dangerous dose. We believe that we have evidence that it is only debilitated persons, those whose heart's action is enfeebled, especially the aged, who suffer and die from proportionally small quantities; and, further, that occasional powerful action of comparatively small doses may be explained by the solubility of the poison in the altered secretions (fatty, for instance) in such persons, and by the deficient excretory and expulsive power of the kidneys and bladder. So far as experience goes, any quantity under ten grams may be safely used." (*Glasgow Med. Four.*; *Am. Four. Med. Sci.*, January, 1883.)

Iodoform in Diabetes.—Bozzolo gave two patients with glycosuria 2. of iodoform daily; with the result of diminishing the secretion of water in both, and of sugar in one. (*Gaz. degli Ospitali*, Feb. 4, 1883; *Lond. Med. Record*, April 15, 1883.)

The Injection of Ethereal Solution of Iodoform in Fungoid Synovitis.—The treatment of chronic arthritis, and more particularly of fungous joint-disease, as at present practised, is, to say the least, far from satisfactory to either patient or surgeon. If, as is by no means improbable, fungoid synovitis is but the first local expression of a commencing tuberculosis, the importance of a speedy cure is manifest, even leaving out of consideration the desirability of preserving the integrity of the joint. But to obtain a speedy cure by the methods of treatment at present in vogue is impossible. To those believing in the tubercular nature of these joint affections, their superficial seat offers great temptation to try the effect of local so-called antiseptic remedies. Many substances have been suggested as suitable for injection into the diseased joints, and some of them have been tried with alleged beneficial results. The late Pro-

fessor Hueter was an enthusiastic advocate of intra-articular injections of carbolic acid, but others who have been led to adopt this method have met with but indifferent success. More recently Mikulicz has proposed the injection of a solution of one part of iodoform to six of sulphuric ether. Acting upon his suggestion, Drs. Neumann and Müller, of Karlsruhe, have treated a number of cases of fungous joint-disease by this method, with, upon the whole, rather encouraging results (*Memorabilien*, July 16, 1883). The injections were made at intervals of from four to fourteen days, a Pravaz syringeful being introduced each time. They were exceedingly painful, and this was the chief objection to their use; for, though there was some immediate increase of swelling, it soon went down again, and an abscess was never seen to result. The treatment must, of course, be begun early, in order to obtain the best results. We shall look for further trials of this method with interest, for any thing that promises to expedite the tedious and exasperatingly slow cure of chronic joint-disease is worthy of earnest consideration. The extremely painful nature of the procedure is certainly a serious disadvantage; but if the method is proved, on further experience, to be of real curative value, this should not militate against its use. It is probable, also, that some means will be devised to obviate this irritant action, or some other solvent of iodoform may be found to be of equal efficacy, and at the same time painless. (*N. Y. Med. Record*, Oct. 6, 1883.)

The Use of Iodoform among the Insane.—Eckelmann, in the asylum of Eberswald, has of late used much iodoform in the operations and injuries occurring among the insane under his care, is greatly pleased with its effects, and says it exerts no evil influence on the mental state, provided proper precautions are taken. Iodoform should be used as little as possible where the heart is weak; in all conditions favoring absorption of the poison, as in fat people (for iodoform is soluble in fat), with carbolic acid (which sets free iodine), in large, fresh, bloody wounds (because, in the decomposition of the blood, oxygen is set free, and that in turn liberates iodine); in conditions which prevent the rapid

elimination of the poison (i. e., in nephritis, and in vesical affections).

Iodoform seems indicated, in tubercular lesions; in conditions where no other antiseptic can be used; with restless and ill-behaved patients; in wounds already infected; in small, fresh wounds, after the hemorrhage has stopped; in all plastic operations; in major operations near the natural openings.

As little as possible should be used: the pulse and temperature should be watched, and the urine examined each day. (*Allgem. Zeitschr. für Psych.*, xl. 1, 2; *Arch. de Neurol.*, November, 1883.)

The Influence of Iodoform on the Migration of White Blood-Corpuscles. — Binz, believing the migration of white blood-corpuscles is due, not to weakening of the arterial wall, and an increased blood-pressure, but to amoeboid movements of the white cells themselves, prefers to treat supuration with remedies which restrain the activity of these cells. External and internal remedies both accomplish this. Quinine in full doses internally controls the amoeboid movements of leucocytes, and prevents their migration. Eucalyptol, salicylic acid, and iodoform act in the same way when locally applied. In the presence of iodoform, the white cells, which collected in the capillaries at the point where irritation was applied, did not change their shape, or undergo amoeboid movement, but remained spheroidal and passive, and could not pass through the wall of the vessel. (*Archiv für path. Anat. und Physiol. und für klin. Med.*, lxxxix. 3, 1882; *N. Y. Med. Jour.*, March 10, 1883.)

The Morbid Anatomy of Iodoform Poisoning. — Hoepff found, post-mortem, in four cases of death from iodoform poisoning, a condition of fatty degeneration of the heart, liver, and kidneys. The process was only beginning in some, but far advanced in others. The author then instituted a series of experiments upon rats, guinea-pigs, and rabbits, administering to them subcutaneous injections of iodoform in oily solution. In every case he found parenchymatous inflammation of the heart, liver, and kidneys. These

experiments, however, do not serve to explain the peculiar cerebral symptoms observed in man after poisoning by this substance. (*Allgem. med. Central-Zeitung*, Aug. 8, 1883; *N. Y. Med. Record*, Sept. 22, 1883.)

Treatment of Wounds with Iodoform. H. Leisrink. (*Centralbl. für Chir.*, No. 35, Sept. 2, 1882.)¹

Gauze, impregnated with sixty per cent by weight of iodoform, is the usual way of employing the drug. Three hundred operative cases were treated in this way, during a period of twelve months, with seventeen deaths. One death, following resection of the hip for disease resulting from gonorrhœal poisoning (?), was caused by iodoform or exhaustion. Five deaths were from septicæmia, two being from peritonitis after ovariectomy, two after amputations, and one in a strumous subject. Eleven deaths were from exhaustion and secondary kidney-disease, one after lithotomy, one after excision of the prostate, three after external urethrotomy, and one each after removal of pelvic tumor through the vagina, and after laparotomy for ileus. Thirty-four of the operations were resections of joints, the proportion of good results being very large. A useful antiseptic drainage-tube has been devised by coating the tube with a deposit of iodoform, a special process being used for the purpose.

Effects of Iron on Digestion. — Düsterhoff, at Berlin, as the result of numerous experiments, concludes that the organic salts of iron check peptic digestion.

He thinks the hydrochloric acid of the gastric juice displaces the organic acids from the iron salts, and the organic acid thus set free is a far less powerful digestive agent than the hydrochloric acid. This cannot be the only disturbance; because the perchloride, phosphate, and reduced iron have a similar effect. Ferrous salts seem to interfere in digestion less than ferric salts. (*Centralbl. für med. Wiss.*, Nov. 11, 1882; *Practitioner*, January, 1883.)

Iron in Infantile Diseases. — Simon, while recognizing the uselessness of treating chlorosis with iron in many in-

¹ Abstracted by Dr. C. H. Knight.

stances, says that in conjunction with inhalations of oxygen, fresh and salt water bathing, etc., which strengthen the appetite and the assimilative powers, he gives the subcarbonate of iron in a powder with rhubarb, canella, and columbo, or the carbonate in the form of Vallet's pills. If, in spite of being taken during the meal, it does not agree, he advises the lactate of iron. Where there is decided loss of tone of the digestive tract, he advises the perchloride of iron. The use of ferruginous waters must not be forgotten. In secondary or symptomatic anæmias, the employment of iron is unsatisfactory. He employs invariably, with tonics, stimulants, and food, the perchloride of iron in diphtheria.

In typhoid-fever, from the end of the second week to complete convalescence, he uses the perchloride of iron systematically.

In conclusion he says, any ferruginous preparations which do not agree with a patient, or his malady, are useless and harmful; for if badly borne they spoil the digestion, interfere with nutrition, and thus impoverish instead of fortifying the blood. (*Prog. Méd.*, April 14, 1883.)

Kairine.—Filehne has studied kairine carefully, both in a chemical and therapeutical way. He divides the kairine group into three distinct bodies,—kairine m. (methylic), kairoline, and kairine e. (ethylic).

The effects of kairine m. in gram doses last only three hours. The fall of temperature is accompanied by profuse sweats, which last while the medicine acts. Toward the close, a chill comes on, and the temperature rapidly rises. The sweats are evidently the effect, and not the cause, of the lowering of the temperature; for the duration is not exact, and does not occur in non-febrile subjects.

The effects of kairoline last six hours, when the temperature gradually rises without a chill.

Of kairine e., he gives .25 of the hydro-chlorate in a capsule, taking care to have the patient drink water afterwards. The first day the temperature should be taken every two hours, to control and follow the action of the doses. In some cases it is better to commence with a dose of .50,

which may be repeated hourly for four hours, or until the temperature falls to 38° , and afterwards hourly doses of .25, unless the temperature rises or a slight chill occurs.

He has given .75 and 1. doses. (*Ueber neue Mittel, welche die fieberhafte Temperatur zur Norm. bringen; Berlin. klin. Woch.*,¹ No. 45, p. 681, Nov. 6, 1882. *Weiteres ueber Kairin und analoge Körper; Berlin. klin. Woch.*, No. 6, p. 77, Feb. 5, 1883. *Ueber den Unterschied in der Wirkung zwischen dem Kairin und dem Kairin M.; Berlin. klin. Woch.*, No. 16, p. 238, April 16, 1883.)

Erlanger says that the sulphate of kairine is a yellowish-brown powder, easily soluble in water, of a salt taste, and an aromatic odor. A single dose of .3 has no appreciable effect on the temperature. After giving .5 or 1., the temperature may fall 1.5 to 2° . This effect appears in twenty minutes, and lasts two hours when the dose is .5, about three hours when the dose is 1. Repeated doses cause a rapid fall of temperature.

In pneumonia, the relief supervening upon the fall of temperature is very marked. The temperature can be kept at about the physiological limit, by giving .75 every two hours. Certain prudence should be exercised in old or enfeebled persons, as doses of 1. or over every two hours may cause some cyanosis. The urine has a dark green tint. (*Berlin. klin. Woch.*, 45, 1882; *L'Union Méd.*, Oct. 4, 1883.)

Ewald has tried the drug in tuberculosis, finding that three doses of .50 at intervals of two hours caused a fall of temperature from 38.4° to 36° in six hours. (*Temperatur-Curven, welche die Temperatur herabsetzende Wirkung des Kairin zeigen. Berlin. klin. Woch.*, No. 24, p. 367, June 11, 1883; *Rev. des. Sci. Méd.*, October, 1883.)

Guttmann has used kairine in forty-two febrile cases, including pneumonia, measles, phthisis, typhus, scarlet-fever, pleurisy, peritonitis, erysipelas, ague, and septicæmia. Hourly or half-hourly doses of from .5 to 1. were given all day.

In about three or four hours the temperature fell to normal, but soon rose again as the effects passed off. Per-

¹ A few patients experience, on taking the drug, a pain in the nose which radiates to the frontal sinuses. (*Rev. des. Sci. Méd.*, October, 1883.)

spiration was induced. With the fall in temperature, was a reduction in the force and frequency of the pulse. The urine was dark green or black for thirty-six hours. The effect of the kairine passed off rapidly, leaving the disease unaltered. (*Berlin. klin. Woch.*, July 30, 1883; *Lond. Med. Record*, Nov. 15, 1883.)

Ludwig finds that only small quantities of kairine are recovered from the urine unchanged. The urine is never albuminous; but a large number of bacteria are present in all cases he has investigated, very soon after it has been passed, showing that kairine must in some way favor their development. (*Wien. med. Blätter*, April 12, 1882; *Lond. Med. Record*, Nov. 15, 1883.)

Varaglia has noticed a fall of temperature, and a slowing of the pulse and respiration. He mentions an itching of the nose, which is almost painful after the first doses. This extends to the throat, and produces a dryness like that of atropine. There is headache occasionally, particularly in women. (*Nota sulla Kairina. Par S. VARAGLIA. Gaz. del Clinische*, xix., Nos. 24, 25. V. PATELLA: *Gaz. Med. Ital. del Prov. Veneto*, April 25, 1883. Also W. ZASSETZKI: *Vratch.*, No. 27, 1883. P. KNABE: *Med. Wiestnik*, No. 22, 1883. W. JONK: *Med. Wiestnik*, No. 28, 1883. *Rev. des Sci. Méd.*, October, 1883.)

Chlorohydrate of Kairine.—Hallopeau, in a communication to the *Société Médicale des Hôpitaux*, reviews the use of this drug as an antipyretic. It was first brought to notice by Filehne.¹ It is really the methylhydrate of oxyquinoline, —a yellowish-gray crystalline powder, very soluble in water, of a saltish, bitter, aromatic taste. In a healthy person, 1.5 produces no effect: in febrile persons, it lowers the temperature.

Filehne advises the administration of .3–.5 every hour in moderate cases of fever. The fall of temperature is accompanied by abundant sweats and a slowing of the pulse. The urine assumes a yellow tint.

Vomiting, vertigo, and deafness do not seem to be produced by the remedy. Its antipyretic action is apparent in all febrile affections.

¹ *Berlin. klin. Woch.*, 1882 and 1883.

Perhaps it acts best in croupous pneumonia. (*Sur un Nouvel Antipyrétique, le Chlorhydrate de Kairine*. Par H. Hallopeau. *L'Union Méd.*, June 3, 1883.)

Decoction of Lemon in the Treatment of Intermittent Fever.—Maghen states, in the *Giornale di Clinica e Terapia* for March, 1883, that he has obtained excellent results in the treatment of intermittent fever and the malarial cachexia by a decoction of lemons. The remedy was recommended to him by another physician; and he tried it first in some old, inveterate cases, without, however, anticipating any remarkable results. The decoction is prepared as follows: A lemon, as fresh as can be obtained, is cut up into small pieces, and put into an earthen vessel. Three glassfuls of water are poured in, and boiled down to one glassful, which is then to be strained through a linen cloth, and cooled in the open air. As a result of his trials of this remedy, the author arrives at the following conclusions: 1. Decoction of lemon, employed in malarial affections, gives results equal, and even superior, to those obtained from quinine. 2. It not only cures when quinine does, but even in those cases in which the latter remedy is useless. 3. It is equally effective in cases of chronic malarial cachexia. 4. It presents none of the disadvantages of quinine (irritation of the mucous membranes, and tinnitus aurium). 5. Its administration is possible, even in catarrhal conditions of the digestive tracts. 6. In addition to these advantages, it possesses the further recommendation of cheapness. In commenting upon these conclusions, Kahn (*Bull. Gén. de Thérap.*, July 30, 1883) states that the natives of French Guiana employ with success the decoction of lemons to ward off a threatened attack of chills and fever. (*N. Y. Med. Record*, Sept. 29, 1883.)

Manganese in Amenorrhœa.—Ringer and Murrell have used manganate in sixty-nine cases of amenorrhœa. The pharmacopœial solution and the permanganate were the preparations used: the latter in the form of pills of .12, increased from three times a day to four times a day. In the commencement, the remedy is given for three or four days

before the menstrual epoch; and, if that does not succeed, the remedy is given continuously, in some cases for nearly three months.

The most striking results have been in young ladies between the ages of eighteen and twenty-five, who from accidental or trivial cause,—such as catching cold, or getting wet,—have “missed” once or twice after having been regular.

In girls of fifteen or sixteen who have never menstruated at all, the treatment is not as certainly successful, but not infrequently acts promptly. On the amenorrhœa of advanced phthisis, it has no effect.

The drug is very disagreeable to take in solution, and generally in any form causes some pain after being swallowed.

To prove it was the manganese that produced the effect, the experimenters found that the manganate of soda in .12 doses, and the binoxide of manganese in .25 pills, were equally efficacious. (*Lancet*, Jan. 6, 1883.)

Mr. Martindale says, if the permanganate is made into pills with a readily oxidizable excipient, spontaneous combustion may take place. He recommends a mixture of vaseline, paraffine wax, and kaoline, as an excipient. (*Lancet*, Jan. 13, 1883.)

Action of Manganese and Iron. — Kobert says .003 of the citrate of manganese and sodium is sufficient to kill a frog, and .001 usually produces symptoms of poisoning. The action is much more rapid than that of iron or tin; and the lethal dose is much smaller than that of cobalt, iron, nickel, or tin. The reverse ought to be the case if Blake's idea were correct, that the lethal activity of metals belonging to the same group increases with their molecular weight. The symptoms produced by a small dose, .0008, consist in paralysis of voluntary motion, while respiration, reflex action, and the circulation remain intact. When the dose is larger, the reflexes become slower, and the heart weaker. A larger dose stops the heart in diastole; the reflexes disappear somewhat later, and the irritability of the nerves and muscles, both directly and through the spinal cord, lasts for hours. If the

quantity of the poison is only just large enough to kill, the voluntary paralysis and slowness of the reflexes are followed by abolition of reflex movements; and only after this does the heart become gradually weaker, and stop in diastole. The early arrest of the heart distinguishes poisoning by manganese from poisoning by iron, nickel, and cobalt, where the heart is the last to be affected, and renders the action of manganese more similar to that of antimony. The paralysis, like that produced by iron, affects the excito-motor ganglia of the heart, so that atropia does not remove the diastolic arrest; while mechanical irritation produces distinct—or at least partial—contractions of the ventricle, and helleborine causes first several more or less powerful beats, and then a stand-still in systole. Camphor and physostigmine, when applied before the heart has been completely arrested, have transient accelerating action, but do not appear to prevent the final diastolic stand-still. The statement of Richet, that manganese causes arrest in hemi-systole, is incorrect. Symptoms of irritation are never observed in frogs when the solution applied is of a proper concentration. Vomiting and fibrillary twitchings of the muscles are also absent, although such twitchings are almost constantly present if the solution contains too much citric acid. The cessation of reflex action shows that the transverse conduction in the spinal cord is weakened or destroyed: the longitudinal conduction is usually perfectly intact, even after death. Neither the peripheral motor-nerves nor the muscular substance are affected. Dogs are most sensitive to the poisonous action of manganese, which is for them five times as poisonous as iron. If manganese were as poisonous for man as for dogs, 0.5 of its oxide would be a lethal dose for an adult. No local symptoms are produced; and death would occur in a similar manner if the quantity were not injected subcutaneously all at once, but only at several times during twenty-four hours.

These facts might render manganese a dangerous poison for criminal purposes, and they must be borne in mind also in regard to the possible use of permanganate of potassium injected subcutaneously as an antidote for snake-poison. In animals that cannot vomit, a large dose causes violent epi-

leptic convulsions, with death in a few moments, or at most in one or two hours. A small dose causes want of appetite, languor, dragging of the legs, a fall of temperature, diminution of reflex action, and finally motor and sensory paralysis, with gradual cessation of respiration, and death. Diarrhoea continued to the last; and the heart, although weak, continued to pulsate after the respiration stopped. Convulsions were rare and transient. In animals capable of it, vomiting occurred soon after the ingestion of the drug, and continued till death. The vomit was often tinged with bile. With a non-toxic dose, these symptoms lasted for three days, during which all food was vomited, but water taken greedily. The urine was abundant, of low specific gravity, and containing very little urea. After a little the urine became bilious, and, in toxic cases, albuminous: jaundice also was seen. In dogs there was great depression, diminution of both motor and sensory power, and drowsiness, which gradually passed into complete loss of reflex action, and death. Convulsions occur in dogs, only when the manganese is injected directly into the blood. It seems to have no action on the gases of the blood; and, unlike phosphorus or arsenic it does not cause the glycogen of the liver to disappear.

It paralyzes the vaso-motor centre in warm-blooded animals. The heart is affected much later, and apparently through the motor ganglia. The vaso-motor nerves do not appear to be paralyzed; as irritation of the spinal cord in the cervical region produced a rise of blood-pressure, even after the poisoning was far advanced. A large dose, thrown into the circulation of warm-blooded animals, causes first cerebral irritation, then convulsions, then paralysis (first of respiration, then of the vaso-motor centre), then apparent irritation of the heart (rapidity like that of chloral), and finally paralysis of the cardiac ganglia. The skeletal muscles were irritable for several minutes after death.

Chronic poisoning by the mouth is impossible, because the drug is not absorbed from the stomach or intestine.

When injected in small quantities several days subcutaneously, it produces inflammation of the kidney, which often cannot be distinguished from parenchymatous nephritis,

vomiting, diarrhoea, jaundice, and inflammation of the intestine. Lead, iron, nickel, and cobalt irritate the kidney also. The excretion of manganese appears to take place chiefly, if not exclusively, in the tubules; but when the blood-pressure was lowered, the metal appeared also in Bowman's capsule. (*Arch. für exper. Path. und Pharm.*, p. 361, vol. xvi.; *Practitioner*, December, 1883.)

The Risks of Massage. By Julius Althaus, M.D.

Massage, which has for a long time been the Cinderella of therapeutics, has recently seen a considerable change in its fortunes, and become as thoroughly fashionable as mesmerism and homœopathy have been at previous periods in the history of medicine. The "Weir-Mitchell" treatment more especially, which has been found very useful in some obstinate forms of hysteria, is now being indiscriminately applied to all sorts of cases of cerebral and spinal disease of which loss of power forms a conspicuous symptom; and it is therefore time that we should say "Hands off!" lest a procedure which does good in a limited class of cases should suffer by the excessive praises of injudicious partisans, and eventually be thrown aside altogether.

Professor Busch of Berlin, who has written the most recent and sensible treatise on massage and gymnastics (in vol. ii., part 2, of Von Ziemssen's *Handbuch der allgemeinen Therapie*, Leipzig, 1882), recommends these proceedings chiefly for the treatment of deformities, and of muscular pain. Amongst nervous affections which have been thus treated, he mentions scrivener's palsy, stammering, some forms of hysteria, and muscular paralysis, or paresis after polio-myelitis; without, however, saying much in favor of this treatment in the latter conditions. It is well known that at various times epilepsy, idiocy, and some forms of insanity, have been treated by massage and gymnastics; but, fortunately, we now hear very little of such therapeutical operations.

It appears to me, that diseases of the brain and spinal cord must, on account of the anatomical situation of these organs, be inaccessible to the influence of massage, which

can only be applicable to more superficial parts of the body. Apart from this, however, it is important to consider that many of the most important diseases of these organs are of an inflammatory or irritant character, either primarily or secondarily; and this should make it self-evident that massage should not be used for their treatment, even if the suffering parts could be reached by it. I will here only allude to many forms of cerebral paralysis from hemorrhage, embolism, and thrombosis, which are followed by sclerosing myelitis of the pyramidal strands; and most forms of primary lateral, posterior, or insular sclerosis of the spinal cord.

It is only charitable to assume that the advocates of massage, who recommend their favorite procedure in such and similar cases, are somewhat at sea with regard to the pathology and diagnosis of diseases of the nervous system.

That which may be good for developing and strengthening healthy muscles, or muscles which have been enfeebled by disuse or certain local morbid conditions, etc., is not for that reason suitable for the treatment of muscular paralysis owing to central disease. In most cases of lateral and insular sclerosis, which are, unfortunately, now much treated with massage and exercises, rest is indicated rather than active exertion; and overstraining of the enfeebled muscles acts prejudicially on the state of the nervous centres. I have recently seen quite a number of instances in which the central disease had been rendered palpably worse by procedures of this kind; and, in a case of cerebral paralysis which was some time ago under my care, the patient had, after four such sittings, been seized with collapse, which nearly carried him off. (*Br. Med. Four.*, June 23, 1883.)

Maté.—The infusion of the leaves and twigs of the ilex maté is in common use by the people on the Rio de la Plata. Among the active principles are, first, essential oils, then resins, and lastly caffeine.

Épery finds it diminishes the secretion of urea in a subject on a regular diet. It produces a certain weakness, so it should be given only with a decidedly nitrogenous diet.

The author thinks the essential oils show the disassimila-

tions by their affinity for oxyhæmoglobine; that they dilate the capillaries, and, by strengthening the heart's beat, produce diaphoresis and lowering of temperature; but they act above all on the muscular system, which they excite, and on the nervous system, but to a less degree.

Dyspepsia and gastralgia are sometimes caused by the resinous ingredients; the caffeine slows the pulse, and produces diuresis, but not to a marked degree.

It fortifies the system against fatigue and excessive muscular exertion. (*Essai sur le Maté.* Par René Épery. *Thèse de Paris*, 1883; *Rev. des. Sci. Méd.*, July, 1883.)

Remarks on Death from Methylene, and on the Use of other Anæsthetics. By F. Junker, M.D., M.R.C.S.

Professor Breisky of Prague, in the *Prager medicinische Wochenschrift*, 1883, No. 22, reports a case of death during the administration of chloride of methylene,¹ which, being the tenth fatal case from this anæsthetic, must considerably shake the confidence of the profession in its perfect safety. The patient, a married woman aged twenty-seven, suffered from a cyst of the right parovarium, for the removal of which ovariectomy was to be performed on May 2, 1883. Dr. Breisky points out, in his paper, that particular precautions and care were considered necessary in administering the narcotic, on account of the anæmic and weak condition of the patient. One of the clinical assistants watched the pulse, whilst another, who possessed great experience in the administration of anæsthetics, gave chloride of methylene in my apparatus. After ten minutes, during which four drachms were inhaled without producing complete anæsthesia, the radial pulse suddenly stopped: respiration, however, continued three minutes after the heart had ceased to beat. The patient was pale and slightly livid. The head was immediately lowered, the tongue was drawn forward, Sylvester's artificial respiration induced, with free admission of fresh air from the open window; the lower limbs were rubbed with hot flannel; ammonia was applied to the nose,

¹ Chloride of methylene is the scientific term for the preparation usually called bichloride of methylene.

and subcutaneous injections of solution of musk were resorted to. But they were of no avail: life had fled. The remainder of the narcotic fluid, which the dispenser of the hospital had obtained direct from London, was handed to Professor Dr. Hofmeister for chemical analysis. I literally transcribe his report:—

“The fluid, which I received in the original bottle, with the label, ‘Bichloride of methylene, CH_2Cl_2 , manufactured by J. Robbins and Co., manufacturing and pharmaceutical chemists, 147 Oxford Street, London,’ was found, on examination, to be a mixture of chloroform and alcohol. This result is identical with the examination of a preparation supposed to be obtained from Robinson and Co., 372 Oxford Street, London,¹ and analyzed by M. C. Traub (*Pharmaceutische Centralbl.*, 1882, p. 461). The fluid under examination resembled chloroform in color and odor. Its density, found by the pycnometric method at 17.1°C ., was 1.3495, which comes very near to the density of pure chloride of methylene.

“Its boiling-point, moreover, proved that the fluid contained either no chloride of methylene at all, or merely traces of it. The boiling-point of chloride of methylene being 41°C .,² the preparation under examination, on the contrary, commenced distilling in the water-bath and Glinsky’s boiling-

¹ M. C. Traub, in stating that the preparation he analyzed was supplied by Robinson, 372 Oxford Street, mistakes the name of the firm; 372 being the old number of the house in which Mr. Robbins’s business is carried on, prior to altering the numbers in 1881. Its present number is 147. Traub reports: “Its specific gravity was 1.326 at 15°C . (59°F .), which corresponds to that of pure bichloride of methylene, mixed with a small percentage of alcohol to improve its keeping quality. On shaking 50 cc. of the bichloride with 50 cc. of water, the volume of the water increases by 7 cc., which is abnormal. The aqueous layer was indifferent to litmus and nitrate of silver. After having been washed with water several times, and dried over chloride of calcium, it was distilled from a water-bath, and almost the entire liquid distilled over at a temperature of 60.5°C ., without varying. The specific gravity of the distillate was 1.489 at 15°C ., corresponding to that of bichloride of methylene containing a trace of alcohol.” Traub therefore concludes that the supposed bichloride of methylene was merely chloroform reduced by alcohol to the specific gravity of bichloride of methylene.

² According to Watts (*Dictionary of Chemistry*), the boiling-point of chloride of methylene is 40°C . Mr. Robbins showed me, lately, an apparatus in action, where bichloride of methylene distilled at a temperature of 52.4°C .

tube at 47° C., and continued so between 49° and 53° C., without leaving a residue. When shaken with water, the components separated. About one-fifth of its volume mixed readily with the water, whilst the volume of the portion insoluble in water underwent no alteration after continued shaking. The clear aqueous solution gave Liebig's iodoform re-action; treated with chloride of benzoyl and concentrated solution of soda, it manifested, in an unmistakable manner, the smell of benzoic ether (Berthelot's alcohol test),—a proof that considerable quantities of alcohol had been taken up from the preparation by the water.

"The residue, which was not dissolved in water, was dehydrated by chloride of calcium, and distilled completely at a temperature of 59.5° to 60.5° C., which corresponds to the boiling-point of chloroform (at 7.37 mm. pressure), which Liebig and Regnault found at 61° C. This distilled fluid had the density of chloroform (1.4885 at 17.1°), or 1.5252 at 0° C. (Watts), and gave, when treated with aniline and alcoholic solution of potash, the smell of isocyan-phenyl, characteristic of chloroform.

"Therefore there can be no doubt that the so-called chloride of methylene under examination was chloroform diluted with absolute alcohol. The proportions, calculated from the density, the diminution of volume when shaken with water, and the quantity of the pure chloroform, were one volume (of alcohol) to four of chloroform. That the boiling-point of this mixture was found lower (51° C.) than the boiling-point of either compound (chloroform boils at 61° C., alcohol at 78° C.), is no contradiction with the result of the examination. It is a well-known fact, that a mixture of two fluids may possess a boiling-point below that of the most volatile of its components. It can be easily proved by experiment, that the boiling-point of chloroform is considerably lowered by addition of absolute alcohol. No decomposition of the constituent chloroform of the preparation could be discovered. An explanation of the fatal effect from this cause must therefore be refuted."

Such is the evidence of the analytical chemist. The necropsy proved highly interesting as regards the complaint

of the deceased, but gave no information as to the cause of death.

The dura mater was normal; the meninges and the substance of the brain were pale, anæmic, and œdematous. There was a small quantity of mucus in the trachea, the mucous membrane of which, as well as of the larynx and the pharynx, was pale. Both lungs were free, their anterior portions pale; the posterior regions contained a moderate quantity of blood; both were œdematous. There was a tablespoonful of clear serum in the pleural cavity, and about 100 centimetres of similar serum in the pericardial cavity. The heart was flaccid, of proportionate size to the body; the valves and the endocardium were normal. Fluid, bright-colored blood mixed with air-bubbles was contained in the ventricles, a few small soft clots of fibrine in the auricles; the lining membrane of the aorta was delicate and normal. There was no evidence of any pathological alteration of the heart, which was normal in its structures. The air-bubbles in the blood of the ventricles were a *post-mortem* production.

Professor Breisky guards himself against the imputation of ascribing the fatal accident to impurities of the anæsthetic fluid. However, he does not consider chloride of methylene to be a safer preparation than chloroform, although he admits preferring it to the latter in laparotomies, as being less liable to provoke vomiting after the operation; an advantage on which also those agree who otherwise are no advocates of methylene.

Sir Spencer Wells, who has used it in nearly all his operations ever since it was introduced by Dr. Richardson in 1867, in my apparatus, and accords to it a decided preference when given, has had, in more than twelve hundred serious operations, no fatal accident. He particularly corroborates the statement, that less sickness follows its administration than after chloroform. I have given it more than four hundred times to Sir Spencer's patients, up to September, 1870, and never met with any disturbance of alarming character. When there was uncontrollable sickness after the operation, it was due to incidental pathological processes. Dr. Day, whose personal experience in the administration of

methylene extends over more than ten years, and who uses my apparatus, has been equally fortunate. The opinions on the general superiority of this preparation, however, differ. Messrs. Marshall, Gamgee, Gaine, Hird, and Rendle speak in its favor. Dawson considers it less dangerous than chloroform. Miall, who in a hundred cases produced perfect anæsthesia in the average time of three minutes and twenty seconds, never used more than 14 cc. There was vomiting in forty cases, nausea in six; the pulse remained unaltered in four cases, was accelerated in one, and retarded in twenty-three. In five cases, the respiration became alarmingly accelerated. Barnes and Taylor consider chloride of methylene a dangerous anæsthetic. One of Mr. Barnes's patients did not recover consciousness until after four hours, which took place under violent vomiting. The pupils did not act until half an hour after the operation. Taylor's patient — a youth, aged seventeen — turned pale after the operation (extirpation of the eye), deeply sighing; respiration, and the pulsation of heart and the carotids, suddenly ceased. He rallied, however, after inversion, artificial respiration, and pressing-forward of the tongue.

Nussbaum (Munich) objects to methylene. He observed great excitability, muscular rigidity, and nausea, and finds fault with the inflammability of the preparation. Hegar and Kaltenbach, who use my apparatus, do not consider it safer than chloroform: they observed alarming asphyxial fits, and object that the patients too quickly and unexpectedly awake, but acknowledge that they had less vomiting and retching, and fewer unpleasant after-symptoms.

Kocher (Bern), who exclusively uses chloride of methylene in my apparatus, in ovariectomies and hysterectomies, ascribes the good effects less to the anæsthetic itself than to the careful preparation of the patient, and the small loss of blood. When there was vomiting, it could be easily stopped. He never observed collapse.

C. Kappeler, in his work *Anæsthetica*, which forms the twentieth volume of Billroth and Luecke's *Deutsche Chirurgie* (Stuttgart, 1880), admits that chloride of methylene is less liable to cause sickness than chloroform; but he denies other

advantages. He considers it equally dangerous with chloroform, if not more so. Death from methylene is similar to that from chloroform, and the *post-mortem* appearances are always negative.

Its specific gravity is 1.346. It decomposes like chloroform when exposed to light or air, and requires, like the latter, an addition of absolute alcohol for keeping. It is very inflammable, but less so than amylene and sulphuric ether. Its flame extinguishes in the gases of its own combustion. The breath, after inhalation, is not inflammable. Its low boiling-point causes its rapid evaporation; therefore its vapors will be more quickly diffused in the lungs than those of chloroform, and also more quickly eliminated from the blood: therefore its effect is more rapid, but less lasting. It causes less muscular excitement than chloroform: I frequently missed it altogether. Fourdes and Kopp observed immediate muscular rigidity after injecting methylene into the arteries. It occasionally produces vomiting, but not so frequent and persevering sickness as chloroform.

In Germany, at present, preference is given to chloroform made from chloral after Professor Oscar Liebreich's method (made by Schering & Co., Wedding, Berlin, N.), which is generally considered safer, and very exceptionally causes vomiting. I saw it given, mostly with my apparatus, several hundred times in the principal hospitals of Berlin on my visit there during last winter's term, and observed vomiting, or retching, only on very few occasions, and can corroborate that after-sickness occurred very seldom.

The sleep produced by methylene, like that of chloroform, lasts longer than the inhalation: therefore its administration may be occasionally interrupted during the operation, whereby the danger of the narcosis is considerably diminished. Ether, on the contrary, must be continued. The patient generally awakes sooner, and recovers his full consciousness more readily, than after chloroform; which I consider rather an advantage than a drawback (see above), disagreeing, in this respect, with Hegar and Kaltenbach. I subjoin the nine published cases of death from methylene which occurred, to my knowledge, up to 1880.

1. (*Lancet*, Oct. 23, 1869.) A patient, aged thirty-nine, at Charing-Cross Hospital, suffered from a malignant tumor in the left antrum of Highmore, which had already caused several very profuse hemorrhages. He looked pale and anxious, but had a normal, not too frequent, pulse. He was narcotized in the sitting posture, and inhaled first 16. cc., and later 8. cc. more, of chloride of methylene. The pupils were, at the time, slightly dilated. During the administration of the second portion of the anæsthetic, his head suddenly dropped; the pulse flagged, and soon ceased altogether. There was neither stertor nor lividity. All attempts to save life failed.

2. (*British Medical Journal*, May 7, 1870.) A healthy-looking man, aged forty, had iridectomy of both eyes performed at Guy's Hospital. He inhaled 4. cc. of chloride of methylene in the recumbent position. He was very excited at the commencement, tried to free his head, struggled with his arms and legs, and turned livid: he became, however, quiet, soon afterwards. He evidenced sensation of pain during the second operation, but looked well. About three minutes after bandaging the eyes, the respiration became superficial and gasping, and the radial pulse could no longer be felt. The angles of the mouth were livid. The patient was at once turned on the left side; but he became pale, and died after a few gasping inspirations. Electricity and artificial respiration during one hour were without result. At the necropsy, the blood was found fluid and dark. All over the right ventricle were numerous ecchymoses of the size of a pin's head. The left ventricle was empty and contracted; the right ventricle contained a small quantity of fluid blood. The lungs were congested.

3. (*British Medical Journal*, April 29, 1871.) A male patient of the Charing-Cross Hospital had a very small quantity of chloride of methylene given. After full narcosis had taken place, a finger was removed within one minute. After the operation was finished, the patient was discovered with the head rolled sideways; the eyes were rotated upwards; pulse and respiration had ceased. The *post-mortem* examination gave no information about the cause of the death.

4. (*British Medical Journal*, Sept. 16, 1871.) A woman aged forty-four, suffering from carcinoma mammæ, had a very small quantity of chloride of methylene given with a flannel bag in the Radcliffe Infirmary, Oxford, and died after two or three convulsive gasps. Artificial respiration, etc., failed.

5. (*British Medical Journal*, Aug. 31, 1872.) A man aged fifty-two had chloride of methylene administered in the Bath United Hospital, in order to have his dislocated shoulder set. He became insensible after two or three minutes, and turned livid: the respiration and pulse ceased at the same moment. The tongue was drawn forward, and ammonia and electricity applied during three-fourths of an hour without effect. His heart was found enlarged and flaccid, but there was no other sign of disease. Chloride of methylene had been used in two hundred and fifty cases in this hospital previously to this fatal accident.

6. (*British Medical Journal*, Oct. 12, 1872.) A male patient, aged forty-eight, who had an abscess to be opened at the Middlesex Hospital, became insensible after the inhalation of 8. cc. of chloride of methylene. After the narcosis had been stopped already one minute, and the operation was going to be performed, the patient was discovered breathless and livid. During Sylvester's artificial respiration, he gasped once or twice, and expired. There was no other abnormal condition found, but a large, flabby heart.

7. (*British Medical Journal*, Oct. 19, 1872.) The patient, aged forty-eight, a brewer's drayman, suffering from an abscess in the ischio-rectal fossa, which burst, leaving a fistula, was admitted into the Middlesex Hospital for the purpose of an operation. He was first very nervous about taking chloroform, saying that he would die under its administration; but, as he refused to have the operation performed without narcosis, 8. cc. of chloride of methylene were given in a perforated leather cone. After a few inhalations, the patient became excited, and his body rigid to the degree of complete opisthotonos; but, as there was no lividity, the narcosis was continued. After two minutes he appeared to be under the full effect of the anæsthetic, and

the cone was removed. But, whilst turning him to the side, he suddenly became livid, and both respiration and pulse ceased. He was placed on the back; and artificial respiration, faradization of the phrenic nerve, and enemata of brandy, were tried without success. His pupils were contracted at the onset of the dangerous symptoms, but soon dilated, and remained so after death. At the necropsy, the body was found livid, the brain healthy, slightly congested. The lining membrane of the trachea and the bronchi was studded with ecchymoses. The right pleura was adherent to the ribs, the left free. The lungs were much congested. The heart was very large and flabby, its surface covered with a quantity of fat. The valves were healthy. Under the microscope, some of the fibres of the heart showed commencing degeneration, but no distinct fat-globules. The heart was empty. The blood was fluid and very dark. There were some patches of atheroma in the aorta. The liver was large, weighing eighty-two ounces, fatty. The kidneys were very congested.

8. (*Lancet*, December, 1874.) A female patient, aged twenty-five, of the Royal London Ophthalmic Hospital, who, on a previous occasion, had already had chloride of methylene given without any alarming consequences, had to undergo an operation on the lachrymal duct. 12. cc. of the anæsthetic were administered by means of a perforated leather cone, lined with flannel. Two minutes after the commencement of the narcosis, the respiration became suddenly noisy and stertorous. The apparatus was removed, and the operation commenced. No alarming symptoms were then discovered, except an unusual paleness of the wings of the nose and of the skin around the mouth, whilst the cheeks and lips were red. The respiration was deep, full, somewhat accelerated; the inspirations were accompanied by palatal stertor. The nostrils appeared flaccid. A few seconds later, the radial pulse became feeble, and soon suddenly ceased: respiration, however, continued, but commenced failing shortly afterwards. Drawing-forward of the tongue, Sylvester's artificial respiration, inversion of the body, flapping the face and chest with towels, ammonia, and enemata of brandy,

produced only a few sighing inspirations; and death took place shortly afterwards.

9. (*British Medical Journal*, July 24, 1875.) A healthy-looking sailor, aged twenty-seven, had iridectomy to be performed in the Central London Ophthalmic Hospital. He was carefully examined before the operation. His pulse was quiet; the action of the heart normal, regular. He was composed, and free from anxiety. At first 2. cc., and afterwards 8. cc., of chloride of methylene, were given in a perforated leather cone. He struggled violently at the commencement, but soon sank backwards and breathed quietly. (It appears that he was narcotized in sitting posture.) Four or five minutes afterwards, when about to be brought into the proper position for the operation, his face was found flushed and livid; the respiration slow, stertorous; the pulse was barely felt. Notwithstanding immediate application of electricity, artificial respiration, etc., the respiration remained irregular, the face livid, until death took place. *Necropsy*.—Heart healthy, containing a very minute quantity of blood. Blood fluid, almost black. All other organs normal.

There are a few more fatal cases recorded, in which, however, chloride of methylene was not given alone, but with other narcotics, mostly with ether. In reviewing these fatal cases, I can barely ascribe them to the effects of the chloride of methylene, whatever the real merits or demerits of this anæsthetic may be. The majority of them appear to me simply cases of suffocation by carbonic acid. The narcotic was given in a solid cone or bag, which, although perforated, surely could not admit sufficient fresh air; and the patient was forced to re-inspire the air already contaminated by his own breathing. Nor does it appear that the apparatus was lifted during the narcotization, whereby air would have gained access. In several of these fatal cases, the alarming symptoms, yea, the death, were only discovered after the removal of the apparatus. Besides, many may justly object to the administration of any narcotic in the sitting position. It should be the general rule, to place the patient on the back, with the head but slightly raised at first; but it may be afterwards turned and kept low during the whole operation.

The above analyses by Dr. Hoffmeister and by Traub are borne out by Regnauld, who lately stated, at a meeting of the Paris Academy of Medicine, that "the bichloride of methylene, so much used as an anæsthetic in England, is composed simply of a mixture of four parts of chloroform and one part of spirit of wood. By adding this spirit of wood to the chloroform, the costs of manufacture are increased to forty-seven francs seventy-five centimes, instead of ten francs." It ought, however, as he asserts, to be cheaper; the spirit of wood being of little value. When the wood is subjected to destructive distillation, there is formed, besides acetic acid, tar, creosote, and other products, one per cent of an inflammable volatile liquid, which, when separated and purified, is the methylic alcohol, or spirit of wood ($\text{CH}^3 \text{HO}$). It represents an anhydrous, mobile, colorless liquid, possessing a hot, pungent taste, and a peculiar aromatic smell, recalling that of acetic acid. It mixes in all proportions with water, alcohol, ether, and chloroform, without losing its transparency. It burns like alcohol, but is less luminous. One-ninth part of spirit of wood added to alcohol renders the latter unfit for consumption, but still serviceable for any other purpose, and thus forms the methylated spirit of trade. Methylic alcohol was introduced into practice some years ago, by Dr. John Hastings of London, as a narcotic, sedative, and anti-emetic. It was proposed as a remedy in consumption; in which, however, it exerts no curative power, but appears to palliate the cough, and to lessen the febrile excitement. Dr. William Yandell, United States, prescribes it in diarrhœa and dysentery. Dr. Christison recommends it for its anti-emetic properties in chronic vomiting, whether depending upon functional or organic disease. To this quality of the methylic alcohol, I am inclined to believe, the preparation sold as bichloride of methylene owes its property of causing vomiting or sickness less frequently than pure chloroform, whereon the opinions of most surgeons agree.

Messrs. Squire, of 413 Oxford Street, prepared for me, according to Regnauld's analysis, a mixture of four parts of Duncan's chloroform, and one part of methylic alcohol. The specific gravity of this preparation is 1.281; that of

Duncan's chloroform, 1.281, 1.492; and that of Robbins's bichloride of methylene, 1.320,—at 15° C., according to Messrs. Squire's testing.

I have had the opportunity of trying the anæsthetic properties of this preparation, which may be called "Regnauld's anæsthetic mixture," in seven cases within the last week; and, as far as my present limited experience proves, it answered admirably, and in its effects is very much like chloride of methylene.

CASE I. — A woman, aged forty, had a large fibrous tumor of the uterus removed by Dr. Bantock at the Samaritan Hospital. Her heart and lungs were healthy. She was very nervous; pulse at the beginning of the narcosis, 100. After inhaling 8 cc. of the mixture, given in my apparatus, she was in deep narcosis in four and a half minutes, without muscular excitement or struggling. The pulse had risen to 120; the pupils were dilated, strabismus divergens. When I stopped the administration of the anæsthetic mixture, twenty-seven minutes after its commencement, she had inhaled 25 cc. The pulse was then 108, the pupils normal. She was in a deep, quiet sleep during the whole of the operation; the face slightly flushed, perspiring, the breathing normal. No retching or nausea during or after the operation.

CASE II. — The patient, aged seventy-two, had an epithelioma of the labium removed by Dr. Bantock in the Samaritan Hospital. Heart and lungs healthy; pulse 100. Deep, quiet narcosis, without muscular excitement, followed in four minutes, after inhaling 5.3 cc. of the mixture; pulse rose to 120; the face was slightly flushed and perspiring as in normal sleep. She had 25 cc. in thirty-four minutes; during which time, however, as in the former case, the administration was discontinued several times, for about five minutes; the patient being under the full influence of the narcotic. No retching or sickness took place.

CASE III. — A patient aged sixty, in the Samaritan Hospital, was operated on by Mr. Meredith for carcinoma mammæ. She was a very stout woman, and, as I was told, by no means a teetotaler. The thoracic viscera were healthy; pulse 100.

She inhaled 12 cc. in seven minutes, when full narcosis took place. There was slight muscular excitement, which, however, soon subsided. Pulse 98; pupils normal.

Pulse after 15 minutes	.	.	.	60
" " 20 "	.	.	.	74
" " 30 "	.	.	.	120 (slight retching of froth).
" " 58 "	.	.	.	76 (end of narcosis).

During this time she had 36 cc. of the mixture. Her behavior during the anæsthetic was like that of the former patients. There was no sickness, except the slight retching of froth, during the operation, nor afterwards.

CASE IV. — A private patient, aged twenty-seven, had hysterotomy performed by Dr. Bantock. The heart and lungs were normal. She was rather nervous; pulse 120. Full anæsthesia was produced after inhaling 4 cc. of the mixture in five minutes, without excitement or retching; pupils contracted, strabismus divergens; pulse 108. After eighteen minutes, pulse 78, pupils normal. After twenty-three minutes, pulse 72; after fifty-six minutes, 92, when the narcosis was stopped, the patient having inhaled 18 cc. of the mixture. No sickness; no nausea.

CASE V. — In a case of exploratory laparotomy by Dr. Bantock, in the Samaritan Hospital, the patient, aged forty-seven, whose heart and lungs were healthy, was in deep narcosis in six minutes, after inhaling 4 cc. of the mixture, and had altogether 12 cc. in twenty-two minutes. There was no muscular excitement nor retching. The pulse at the commencement was 120; sunk after fifteen minutes to 94; and after twenty-two minutes, when the narcosis was stopped, to 80.

CASE VI. — Dr. Marion Sims removed several small fibrous growths from the uterine cavity of a patient, aged forty-eight, highly anæmic from repeated hemorrhages, in consequence of which also great nervousity and partial aphasia. Thoracic viscera normal; pulse 108. She was much afraid of any narcotic, but, when on the operating-table, quietly inhaled the mixture given in my apparatus very slowly; so that 2 cc. brought her in deep, quiet sleep in seven minutes. Pulse, 98; after fifteen minutes, 84; after twenty minutes, 87, when the

narcosis was stopped, only 12 cc. having been given. The patient was quietly sleeping during the operation; about half an hour after, a momentary slight retching of froth.

CASE VII. — Another patient of Dr. Marion Sims, aged forty, suffering from a very high degree of vaginismus. Pulse, 100. Full narcosis in ten minutes, after inhaling 8 cc. of the mixture. Had 28 cc. in thirty minutes, when the anæsthesia was stopped; pulse 88. The patient was quietly breathing, and kept perfectly quiet; but the slightest touch of the genitals brought on a start like an electric shock. During the whole time of the operation (thirty minutes), the narcotic mixture was given without interruption; whilst in the other cases it was occasionally discontinued for five minutes and longer. When awaking, the patient said that she did not feel any thing of the operation, but complained of local pain. She had no retching during the operation; but, whilst removing her into her bed, she brought up about a mouthful of water. All these patients recovered full consciousness almost immediately after the operation, and looked as well as after a natural sleep. There was no struggling or muscular excitement, except very slightly in Case III., and the abnormal reflex movements in Case VI., which were due to the peculiar complaint of the patient.

Dr. Bantock had this mixture given since in two other cases in the Samaritan Hospital, — in one of abdominal section, and in another of extirpation of a cyst from the leg, — in neither of which sickness or nausea was caused by the narcotic. (*Brit. Med. Four.*, July 21, 1883.)

Statistics of Anæsthetics in Relation to After-Sickness and Death-Rate. By R. Marcus Gunn, M.B., F.R.C.S.

The following statistics are based on my experience of anæsthetics at Moorfields Ophthalmic Hospital from Nov. 1, 1876, till Jan. 17, 1880. Notes were kept of the cases, as to sex, age, the anæsthetic employed, and the hour when food was last taken, in reference to the occurrence of sickness. The condition of the weather as to barometric pressure, temperature, etc., was also noted; the weekly chart of the *Times* being used for this purpose.

Whenever any retching occurred during the operation, or within the next two hours, the patient was described as having been sick. Sickness while on the operating-table was comparatively rare, but the proportion of cases in which it occurred afterwards seems large.¹ This latter fact is probably accounted for, partly by the profound anæsthesia necessary for eye-operations, and partly by the large number of young out-patients, who, notwithstanding all directions to the contrary, had eaten shortly before. What the usual percentage of sickness at other hospitals is, would be interesting to know.

Anæsthetics were given altogether 4,138 times: there was sickness in 1,902 cases, or in forty-five per cent.

Sex. — From the following table, it appears that females have a decidedly greater tendency to this form of sickness than males.

Sex.	Total.	Sick.	Percentage of Sick.
Males	2,130	870	40
Females	1,982	1,027	51
Not stated	26	5	—

Age.

Age.	Total.	Sick.	Percentage of Sick.
Under 1 year	119	5	4
Above 1 year and under 5 years	446	137	31
“ 5 years and under 10 years	555	349	63
“ 10 “ “ 15 “	456	331	72
“ 15 “ “ 20 “	445	268	60
“ 20 “ “ 25 “	285	161	56
“ 25 “ “ 30 “	182	96	52
“ 30 “ “ 40 “	289	119	39
“ 40 “ “ 50 “	319	101	31
“ 50 “ “ 60 “	363	119	32
“ 60 “ “ 70 “	438	138	31
“ 70 “ “ 80 “	183	50	27
“ 80 “ “ 90 “	17	5	29
Age not stated	40	23	—

¹ In the Report on the Action of Anæsthetics, by M'Kendrick, Coats, and Newman (British Medical Journal, 1880, II., p. 957), a still higher percentage is given — viz., 48 per cent — in the case of ethidene dichloride, and chloroform.

The liability to sickness is thus at a maximum about the commencement of puberty, and decreases gradually towards each end of life. Under one year of age, there is very little sickness. There is a second slight increase in the percentage of sick in extreme old age; but the total number of cases observed at this period of life (above eighty years) was too small to draw any positive conclusion. The youngest patient I anæsthetized was aged fourteen days, and the oldest was eighty-six years. I consider *age* the most important factor in relation to after-sickness.

Anæsthetic. — Chloroform was frequently used for children under three, and for adults over sixty. Between these ages, ether, a mixture of ether and chloroform vapor, or the ACE mixture, was employed. Until the introduction of Clover's inhaler, ether was always given in a hollow, conical sponge, about four ounces being necessary for each case. The objections to this method were its extravagance, the choking sensation and struggling of the patient, and the disagreeable smell of ether that impregnated the air and the clothes of every one around. In March, 1877, Clover's small ether-inhaler was first employed. The original form was found inconvenient, on account of the frequent necessity of removing the whole apparatus during the operation, whenever the bag became too highly charged with carbonic-acid gas. To obviate this difficulty, I had a valve made on the brass tube leading to the bag: so that, by pressure on this, the bag could be emptied, and fresh atmospheric air supplied, without disturbing the face-piece. By placing over this valve a layer of lint, on which about half a drachm of chloroform had been poured, I found that the choking sensation and struggling during the early stages of ether inhalation were in great measure prevented, and the time necessary for anæsthesia considerably shortened. One great advantage of this form of apparatus is the ease with which the breathing can be watched from its effect on the bag. The amount of ether can be graduated, too, and more or less chloroform or ether given, as symptoms may indicate. About 2 cc. of chloroform and 30 cc. of ether were sufficient for anæsthesia, and the average time was about four minutes. This combination of

the vapors corresponds to the heading "Ether and Chloroform" used below.

By "ACE" is meant the usual mixture of absolute alcohol, chloroform, and ether, in the respective proportions of one, two, and three parts.

	Total.	Sick.	Percentage.
Ether (by sponge) . . .	263	128	48
Ether (Clover's inhaler) . .	1,072	574	53
Ether and chloroform . . .	2,306	1,089	47
Chloroform	320	61	19
ACE mixture	58	17	29
Not stated	83	33	—

One is at first struck with the small percentage of sickness after chloroform. But it must be borne in mind, as mentioned above, that it was chiefly given at the extremes of life, — at periods which are naturally less liable to sickness after anæsthetics. It may be argued, that these tables show a small percentage of sickness in the very young and old, because chloroform was used in such cases. As a fact, however, the ether and chloroform mixture was employed in the majority of them; and the result as to sickness was the same.

One of the arguments used in favor of ether, especially in cases of ovariectomy, is less liability to sickness than with chloroform. My impression is, that, ages being equal, the tendency to after-sickness is about the same with each; but the nature of the sickness is different in the two cases. Ether-sickness seldom lasts long after the stomach is emptied, though there are complaints for some time of a "nasty taste in the throat." Chloroform-sickness often continues for several hours, and leads to great exhaustion.

Influence of Food.—From a careful comparison of the cases, I draw two conclusions:—

1. No breakfast¹ (or too long a fast) is a disadvantage, especially in the very young and the aged.

¹ The operations at Moorfields are performed from about 10.30 to 1.30. No breakfast was frequently recommended.

2. Speaking generally, seven to eight o'clock seems to have been the most favorable time for breakfast, for patients of all ages; i.e., the last meal should be given about four hours before operation.

Influence of Weather. — It must have been remarked by every one in the habit of giving anæsthetics, that on certain days nearly every case is sick; while on other days sickness is quite exceptional, or even entirely absent. These meteorological notes were kept (mainly at the suggestion of my predecessor in office, Mr. Morton) to see how far the weather had an effect in this way.

During the entire period of three years, there were fifty days on which the tendency to sickness was exceptionally great. The temperature of the theatre was kept fairly uniform, except in very warm summer weather; and neither this nor the barometric pressure seems to have had any influence on the liability to sickness. The only peculiar coincidence (which I simply mention, without laying any stress upon it) is in reference to the direction of the wind. Of the forty-two sick days, on one only was the wind easterly; while it was from that exact quarter on eleven of the fifty exceptionally exempt days. The moisture of the air, as measured by the wet and dry bulb thermometers, varied much in both series.

Several of these exceptional days could be accounted for by the ages of the patients that were anæsthetized. Thus, if nearly all were in early adult life, or about the age of puberty, the rate of sickness was high: if, on the contrary, there were many very young children, or aged adults, the rate was low. Still, however, there remained many days on which the peculiar liability to, or immunity from, sickness could not thus, or in any other apparent way, be explained.

On comparing the corresponding months of the three years, the greatest percentage of sickness for the entire month occurred twice in January; the lowest percentage always in March.

Mortality. — One death occurred, the details of which were published at the time in this journal (1877, vol. ii., pp. 266 and 318). The patient was a very stout woman, aged forty-six. Before going into the operating-theatre, she told the

nurse that she would die on the table. She inhaled a mixture of ether and chloroform vapor for about one minute, when the pulse became very feeble, and the respirations shallow. The anæsthetic was then at once removed, and stimulants tried (flicking with wet towel, etc.). The pulse and respiration persisted for fully four minutes after the discontinuance of the anæsthetic, but then ceased, notwithstanding artificial respiration and other measures. At the necropsy, the muscular walls of the heart were found to be fattily degenerated, and there was much fatty growth around the organ. The mitral orifice was contracted, and the aortic valves incompetent. Considering all the circumstances of the case, I am inclined to think that the death occurred more from shock than from any poisonous dose of the anæsthetic.

How far the following case is to be considered one of death due to anæsthesia, it is now impossible to say. The patient was a thin, delicate-looking girl, aged eight, with light hair and fair complexion. She took the anæsthetic (ether and chloroform) well, seemed to recover in the usual way, and spoke once to the nurse in reply to a question. She continued to look pale, however, and became sick for the first time more than an hour after the operation. Being an out-patient, she was shortly afterwards taken home by her parents, travelling in a tramway-car. Next morning the father called, and told me that she never spoke after leaving the hospital, and died in the evening. There was no necropsy, and I was not summoned to attend the inquest.

Ether was introduced as the principal anæsthetic at Moorfields about the beginning of 1874. Calculating that anæsthetics have been given from that date until now at the same rate as during my term of office,¹ — a perfectly just calculation, — we have a total of about thirteen thousand administrations. The only fatal result that can be fairly attributed to the anæsthetic is that of the woman mentioned above.

Next to carelessness in administration, nothing is more calculated to increase the death-rate of anæsthesia than

¹ I gave no anæsthetics during about two months of this period, on account of the hospital being closed for repairs. This must be considered in making the calculation.

wide-spread dread of its danger. An article by Mr. Roger Williams, recently published in this journal, is, I consider, calculated to do harm in this direction. His position as surgical registrar to an important hospital gives an official weight to his remarks, and lay readers might therefore be unduly influenced by them. His experience — a mortality of one in three hundred and fifty inhalations — is certainly exceptional; and I cannot believe that "the majority of fatal cases are hushed up." Even this frightful mortality does not, according to Mr. Williams, "represent the whole of the danger; for, in a still larger proportion of cases, alarming symptoms supervened, and fatal results were only narrowly avoided." Now, alarming symptoms will, we all know, unavoidably occur occasionally during anæsthesia; but, the greater the proportion of such cases to the actual number of deaths, the smaller the *real* danger of the anæsthetic. In other words, the danger is estimated by an appeal to the death-rate; and the more frequently we can avoid a fatal termination after the occurrence of alarming symptoms, the more we are encouraged. The hypothetically perfect anæsthetic should cause neither alarm nor death, but I fear it will never be found.

Again, the anæsthetic must not be blamed for all cases of death during its administration. Chloroform vapor, without a due admixture of air, will paralyze a strong heart, not to mention a fatty one. (See Case I., described by Mr. Williams.) The shock of a severe operation may kill without any anæsthetic, and none the less when perfect anæsthesia has not been produced. (See Cases IV. and VI.) In both these cases, too, blood was found at the necropsy, even in the smaller bronchi; and, in Case VI., the "lungs were firmly bound to the chest-walls by old adhesions."

A moribund patient may die from the mere shock of removal to the theatre, and the dread of the impending operation; nor is this risk removed till perfect anæsthesia has been produced. If chloroform be given to such an one while the head is raised, and if, under such circumstances, death occur, we should not lay much blame on the anæsthetic. (See Case II.)

The vomiting of acute intestinal obstruction and peritonitis has been justly attributed to peripheral irritation of the vagus; the great and early collapse in such cases may fairly be held to be due to a reflex inhibition of the heart's action, through the influence of the same peripheral irritation on this nerve. The dilatation of the cardiac orifice of the stomach, which occurs as a preliminary to the act of vomiting, is, like the inhibition of the heart's action, here caused in a reflex manner, by impulses descending the vagi. Great dilatation of the orifice, manifested by a sudden large gush of vomited matter, is, then, a sign of a powerful descending impulse; a sudden stoppage of the heart's action in diastole is also produced by a powerful descending impulse. It cannot, then, be a matter for surprise, that death should so often occur in this manner, in cases of acute intestinal obstruction; and we may surely expect to meet with this association of vomiting and sudden heart-failure occasionally during, as well as before and after, the induction of anæsthesia. Three of Mr. Williams's cases (III. and V., and an additional one brought forward by him in the *Journal* of May 5) are of this nature. In all of them, vomiting occurred at or about the last moment of life; in two of them, the heart was found, at the necropsy, in the condition of diastole. In the remaining one, I think death might have been at least as fairly attributed to the presence of foreign material in the air-passages as to the anæsthetic: "The air-passages, even to the smallest bronchi, contained fluid fæcal matter, which was probably forced into them during the process of artificial respiration."

On the whole, I think that the cases (seven in number) brought forward by Mr. Williams are unfortunate, and most unsuitable for the purpose of founding a death-rate upon them. A rate of one in three hundred and fifty inhalations, due really to the anæsthetic, is, I hold, much too high. A mortality of one (or at most two) in thirteen thousand cases, as at Moorfields, corresponds more nearly, I think, with general experience. I can truly say that not one of our cases was hushed up.

I suppose I need hardly say, that, on the subject of anæsthetics, I do not speak as a specialist, but only with the

object of making my past experience of some service. My aim has been a double one: viz., first, to show how far my statistics explain the liability to after-sickness; secondly, and more especially, to prevent an unwarranted popular dread of anæsthetics,—a dread, I am convinced, in itself most dangerous. (*Br. Med. Jour.*, July 21, 1883.)

Milk-Diet in Graves's Disease.—Schnaubert and Shumova speak very favorably of the value of an exclusive milk-diet in cases of exophthalmic goitre. Three cases are reported as very much benefited. (*Botkin's Ejenedeln. klin. Gaz.*, Nos. 1, 5, 13, 1882; *Lond. Med. Record*, Feb. 15, 1883.)

Action of Drugs on the Secretion of Milk.—Stumpf concludes that iodide of potassium diminishes, salicylic acid increases, while alcohol, morphia, lead, and pilocarpine have no effect on, the quantity of milk.

Iodide of potassium disturbs the qualitative relation of the constituents of milk; alcohol only increases the relative proportion of fat; salicylic acid appears slightly to increase the quantity of sugar.

Iodine passes quickly into milk, and disappears as soon as ingestion ceases. Lead and salicylic acid pass only into the milk in small quantities. (*Deut. Archiv für klin. Med.*, p. 20, vol. xxx.; *Practitioner*, June, 1883.)

Naphthaline as an Antiseptic.¹—In a monograph entitled *Die Wundbehandlung mit Naphthalin*, Bonning, from an experience with this drug in upwards of fifty cases, sums up its advantages as follows: (1) It is very cheap,—a consideration not to be despised, especially in hospital practice. (2) It is convenient to handle, and easy of application: it is simply sprinkled in powder on the wounded surfaces and the dressings, or cavities may be filled with it. (3) It is not poisonous, and thus may be used without fear in cases in which the employment of carbolic acid or iodoform might be followed by unpleasant consequences.

In a brochure entitled *Naphthalin in der Heilkunde und in der Landwirthschaft*, Dr. E. Fischer reiterates the above

¹ Abstracted by Dr. C. H. Knight.

advantages of this agent, and enumerates the following disadvantages: (1) its insolubility in water, whereby it is unsuitable for the disinfection of wounds which are to be closed by suture; (2) its disagreeable odor; (3) the profuse secretion it excites when applied to an extensive surface. Its use in parasitic skin-diseases is also recommended. (*N. Y. Med. Record*, June 30, 1883, 707.)

Naphthaline in the Treatment of Wounds.¹ By G. R. Fowler.

Naphthaline was first made from coal-tar by Garden, in 1820, and was first applied in surgery by Lücke and Fischer of Strasbourg. Hoeftman, who has had large experience with it at Schoenborn's clinic in Königsberg, bases his objections to its use upon the following grounds: (1) It irritates fresh wounds, and interferes with union by first intention; hemorrhage is induced, and the secretions are increased; (2) it interferes with drainage, by its tendency to form crusts; (3) it produces eczema; (4) it causes pain; (5) its antiseptic power is inferior to that of carbolic acid and of iodoform. The author undertakes to answer the above objections. First, in operation wounds, and recent injuries of the soft parts, where union by first intention is desired, it is undesirable to keep any antiseptic in contact with the surface of the wound, after it has once been rendered aseptic by irrigation with carbolic acid or chloride of zinc. This is equally true, whether primary approximation of the wound be practised, or the secondary suture of Kocher be resorted to. In the latter case, the wound is allowed to gape widely for twenty-four hours, the sutures having been placed in position. At the end of that period, or sooner, — the wound meanwhile having been kept aseptic with naphthaline, — the sutures are tightened, and primary union takes place. All the naphthaline is washed away, before the wound-surfaces are brought in contact, by carbolic irrigation. The use of carbolic acid in conjunction with naphthaline is condemned by Fischer, who believes that capillary oozing is encouraged by their combination. The employment of too firm press-

¹ Abstracted by Dr. C. H. Knight.

ure with the dressing, upon a wound to which naphthaline has been applied, is apt to provoke hemorrhage. The interposition of a single thickness of perforated oiled silk between the powder and the surface of an ulcer of the leg, for example, leaves nothing to be desired in the way of a simple and effective antiseptic dressing. The secretions are increased, but this fact seems not to interfere with the healing process. Second, the crusts formed by naphthaline do not interfere with drainage if the dressings are properly applied. These scales are always loosely adherent, and the secretions easily find their way from beneath them. Third, the nearest approach to eczema has been met with in old ulcers in the shape of excoriations, which were clearly due to neglect of the dressings, and which quickly disappeared under oxide-of-zinc ointment. Fourth, the author has in no case received any especial complaint of pain from the applications. Fifth, The antiseptic power of naphthaline seems to be in no respect inferior, provided the agent be brought in thorough contact with the surface by a proper arrangement of the dressings. For rendering aseptic a wound which has become septic, chloride of zinc, in one-fifth of one per cent solution, is considered better than naphthaline and than carbolic acid. The experiments of Bonning (*Inaugural Thesis*, Strasbourg, 1883) are interesting and valuable. He found it impossible to infect a wound, protected by naphthaline, with pus of septic nature. Moreover, septic wounds were readily disinfected by the use of naphthaline. A cathartic effect followed its internal use in two and three grain doses. In some instances, slight scalding in urination was produced. Neither albumen, nor trace of the drug, was found in the urine, nor were the sulphates decreased. No effect on the heart or upon temperature was perceived.

Naphthaline gauze is prepared as follows: Common cheese-cloth or coarse cotton fabric is rendered hygroscopic by boiling in a solution of caustic soda. After being washed and dried, it is saturated in a mixture composed of naphthaline one ounce, and paraffine, glycerine, and alcohol, each two ounces. The glycerine and alcohol are mixed, and added to the melted paraffine; and lastly the naphthaline is dissolved

in the warm mixture. The above is sufficient for five yards of dressing. The cloth is dipped in the hot mixture, passed through a common clothes-wringer, and kept for use in closely covered tin cans.

In *The Weekly Medical Review*, Chicago, 1883, vii. 54, is an article by Park, warmly commending naphthaline as a surgical dressing. It may be used in powder, or, better, in the form of ointment, 1 to 2.5 in 10. Gauze may be prepared by boiling fine cheese-cloth in a solution of carbonate of sodium and chloride of lime, of sufficient strength to cleanse and disinfect. After having been dried, the cloth is placed in a saturated solution of naphthaline in benzine or gasoline, contained in a stone jar. After soaking a day or two, the cloth is removed, and hung up to allow the benzine to evaporate. It makes a very effective and a very cheap dressing. Park has used naphthaline in one case of facial erysipelas, and he corroborates Fischer's observation of its specific action in this disease. (*Ann. Anat. and Surg.*, Brooklyn, May, 1883.)

Naphthol in Eczema.—Kaposi, in idiopathic eczema, uses naphthol when the squamous stage is reached. In acute eczema, the medicament provokes an active irritation of the skin. When the eczema is symptomatic, the treatment is proper in all stages. He applies a pomade of 1. or 1.5 per cent morning and night, and covers with powdered starch.

In chronic eczema, where the epidermis is thickened, he uses a 2.-3. per cent pomade. In eczema of the scalp, the oil of naphthol gives the best results. (*Annales de Dermatologie*; abstracted in *Prog. Méd.*, July 14, 1883.)

Van Harlingen has found it of great service in scabies, also of some value in the treatment of psoriasis. In parasitic diseases it was of but little use, while in eczema and hyperidrosis it was entirely without value.

Fox, after using it much, has become convinced that it fell far short of taking the place of tar. In a few cases of eczema of the scrotum and anus, he had obtained very satisfactory results from the application of a five per-cent ointment. (*Proceed. Am. Dermat. Asso.*, Aug. 29, 1883; *N. Y. Med. Jour.*, Sept. 8, 1883.)

Experiments in the Use of Naphthol for the Treatment of Skin Diseases. — Van Harlingen, of Philadelphia, reports in *The American Journal of the Medical Sciences* for October, 1883, the results of his experience with the use of this drug, which was first brought to the notice of the profession by Professor Kaposi of Vienna, about two years ago.

He finds it is one of the most efficient and agreeable remedies for scabies which has as yet been brought forward. Both in the rapidity of its action, and in its beneficial effects upon the inflamed skin, it is superior to any of the means ordinarily employed for the cure of this disease. Its exact place in dermal therapeutics remains to be ascertained, but he is inclined to think that it will not prove an unimportant one.

In eczema it has failed, in his hands, to give the same beneficial results as were obtained by Kaposi. In most cases of vesicular, and in acute eczema generally, its action is simply that of an irritant. On the other hand, it has a limited field of action in the cure of a certain number of cases of squamous eczema of the scalp.

In his opinion, it is a valuable addition to our external means of treatment in psoriasis. Kaposi speaks well of it in psoriasis of the scalp in particular; and his experience would lead him to place it near chrysarobine and pyrogalllic acid in effectiveness, without the neutralizing disadvantages of either of these drugs.

In seborrhœa of the scalp, naphthol is a decided addition to our means of treatment. While inferior in some respects to sulphur or carbolic acid, it has a certain range of usefulness which further experience will in all probability more exactly demonstrate.

Naphthol is highly lauded by Kaposi in the treatment of hyperidrosis; but in Van Harlingen's hands it has failed entirely, although used strictly according to his formulæ. He considers it quite valueless in this disease, so far as his experience goes.

His experience leads him to regard its effects in ringworm as inferior to almost all of the remedies at present used,

and as almost entirely inefficient in most cases of tinea versicolor.

In pediculosis he has had no experience, but in a single case of pediculosis capitis its action was favorable.

Nigella Sativa.—Pellacani finds in this drug two alkaloids,—nigelline and connigelline. Nigelline produces effects similar to those of curare, and in mammals it must be given by intravenous injection. It produces a paralysis, which is slight, and is easily dissipated by artificial respiration.

In frogs, nigelline in large doses finally paralyzes the heart. With mammals, it produces a slight elevation of arterial pressure; it excites the secretion of saliva and tears, and the peristaltic action of the intestines, and produces some dyspnœa.

The alkaloid connigelline, in frogs, paralyzes the brain, in large doses, and kills in this way. It paralyzes the inhibitory fibres of the vagus, and, in larger doses, the cardiac muscle itself.

Its action on the heart is similar to that of jaborine and atropine, and like them neutralizes the paralyzing power of muscarine. (*Sui Principii attivi della Nigella Sativa; Ann. Univ. di Med. e Chir.*, January, 1883; and *Ueber die wirksamen Bestandtheile des gemeinen Schwarzkümmels; Archiv für experim. Patholog. und. Pharmacolog.*, Band xvi., Hefte 5, 6, p. 440; *Rev. des Sci. Méd.*, July, 1883.)

Oxygenated Water: its Preparation in a Pure State, and its Application to Surgery and Medicine. By Baldy. (Paris, 1883.)

Numerous observations show the germicide power of oxygenated water, and its usefulness in parasitic affections. It has been used in the dressing of phlegmons, abscesses, lacerations of the perineum, hydatid cysts, metritis, purulent ophthalmia, gonorrhœa, ecthyma, herpes circinata, and pityriasis. Fabre has found it useful in washing out the bladder; he finds also that the spores of tinea and stomatitis and the acarus scabies are killed by it. (*L'Union Méd.*, Oct. 28, 1883.)

Oxygenated Water in Surgery.—Larrivé recommends for surgical use a solution of three or four volumes of oxygen to the litre of water: a stronger solution is caustic. It prevents the development of microbes and other ferments which appear in wounds. It acts especially well in old wounds and ulcers, where the stimulation of the free oxygen is needed. It is odorless. (*Thèse de Paris*, January, 1883; *Bull. Gén. de Thérap.*, Aug. 30, 1883.)

Inhalation of Oxygen in Tuberculosis.—Albrecht finds that with no other treatment the patients cease to lose weight, and in some cases even gain. Those patients were chosen in whom the bacillus of Koch was found.

In inoculated animals, he found those not treated by inhalation died in four months, while those inhaling oxygen were still alive at six months. (*Deut. med. Woch.*, July 18, 1883; *Lond. Med. Record*, Oct. 15, 1883.)

Oxygen in Gas-poisoning.—Clark relates the case of a woman of forty, who was found in a room filled with illuminating gas, where she had lain fifteen hours.

On admission she was suffering from pulmonary oedema; the radial pulse was scarcely perceptible; she was unconscious and cyanotic, with cold extremities, and trismus, and rigidity of the flexor muscles. The urine was voided involuntarily. The pupils were slightly contracted. Frothy mucus issued from the mouth. Temperature was 36° C., and respiration 40. Oxygen was administered three hours. Dry cups to the chest, tincture of digitalis endermically, whiskey hypodermically, hot-water bottles, and flagellations constituted the treatment. (*N. Y. Med. Jour.*, Aug. 11, 1883.)

Ozonized Air as a Soporific.—Binz caused twelve persons to inhale air containing ozone generated by two Grove cells. In most cases, a more or less profound sleep or sleepiness was produced.

Some subjects had depression, others irritation of the muscles of the face, and a few a sensation of warmth in various parts of the body.

The mixture irritates the air-passages, in most cases, unless the ozone is well diluted.

Binz has observed that ozone alters the brain-substance, when brought in contact with it, in the same way as do certain narcotics; the chief change being in the nuclei of the nerve-cells. He suggests its use in certain cases of asthma with a torpid condition of the air-passages. (*Berlin. klin. Woch.*, 1882, No. 43; *Lond. Med. Record*, Jan. 15, 1883.)

Paraldehyde.—Cervello gives as its formula $C_6 H_{12} O_3$; describes it as a colorless liquid, boiling at $124^\circ C.$, having a specific gravity of 998 at $15^\circ C.$, while at $10.5^\circ C.$, it solidifies into fusible crystals. It is soluble in eight volumes of water at $13^\circ C.$

Its anæsthetic stage is not preceded by a period of exaltation. It acts especially on the cerebral hemispheres, afterwards on the medulla and cord. In large doses it paralyzes the medulla, and respiration ceases; the heart only stopping because of the cessation of respiration. Its dose is double that of chloral, and 10. may be given. It is best given in water or aromatic tincture. (*Archivio per le Sci. Med.*, vol. vi.; *Lond. Med. Record*, Jan. 15, 1883.)

Langreuter puts down the dose as 6. Beyond a slight and transitory irregularity of the pulse, no abnormal phenomena were observed. The pulse was always somewhat fuller. During sleep produced by the drug, the breathing was deeper and slower; the pupils were not as much contracted as in normal sleep, but dilatation was rarely noticed. Sleep ensued in from five minutes to half an hour. In two cases, the patients fell from the chair within a minute after taking the dose. Quiet favored the hypnotic effect, which took place after ninety per cent of the evening doses and after sixty-one per cent of those given by day. Its quieting effect was noticed even when sleep did not follow, and was well marked in excited paralytics, epileptics, patients with migraine, etc. (*Deut. Medicinal-Zeitung*, Aug. 23, 1883; *N. Y. Med. Jour.*, Sept. 22, 1883.)

Morselli, in cases of mental excitement, finds this drug an efficient hypnotic without depressing the circulation. On the disease itself, it has no effect. In cases of depression, as in melancholia, it is less efficacious.

In idiocy with agitation, in the excitement of general paresis and of hysteria, the drug is useful, but only because of its hypnotic effect, which makes it useful in the insomnia of fever, rheumatism, gout, prurigo, chloro-anæmia, etc. (*Il Pisani*, iv., v., vi., 1883; *Gaz. hebdom.*, Aug. 24, 1883.)

Pereth noted its effect on four healthy persons, and thirty-two patients with different maladies, in doses of from 2.-6. Healthy persons after taking the drug have a feeling of lassitude and drowsiness, followed by deep sleep and loud snoring. The breathing and the pulse became slower; the temperature fell slightly; the pupils were unchanged. One patient took 179. in forty-two days. In slight cases of depression, he thinks it almost curative.

Paraldehyde as an Hypnotic. — Morselli and Bergesio find that paraldehyde does not lower the arterial pressure as does chloral. During its sleep the reflexes are abolished, the pulse is less frequent, and regular. In doses of 2.-3. it induces tranquil, reparative sleep, not followed by headache, anorexia, or mental confusion. It is useful in the maniacal attacks of general paralysis, in acute and chronic mania, delirium tremens, etc. (*Gen. Cong. Ital. Med. Asso.*, September, 1882; *Lond. Med. Record*, Jan. 15, 1883.)

Peat as a Surgical Dressing.¹ — Sands has tested the value of peat as a surgical dressing, in his service at the Roosevelt Hospital, and in many respects has found it superior. After having been moistened, — usually a solution of bichloride of mercury being used for this purpose, — it was found to be capable of absorbing at least five or six times its weight. It is used in bags of suitable size and shape, which although bulky can be nicely fitted to the parts, and are worn with comfort. In a case of white swelling, the extremities of the radius and of the ulna, all but two of the carpal bones, and several of the metacarpal bones, having been excised, a peat dressing was removed not until the end of three weeks. At the end of that period, the wound was found to be quite healed, except at a limited granulating surface; a decalcified

¹ Abstracted by Dr. C. H. Knight.

bone drainage-tube, which had been inserted, was entirely absorbed, and no suppuration had taken place. A striking contrast between the Lister dressing and the peat dressing had been noticed in two excisions of the elbow-joint in a child. In the first operation, the former application was used, and, being impervious, soon became foul, suppuration being profuse. In the second excision, the peat dressing was used. The dressing being porous, the discharges are absorbed, and appear at the surface, where they evaporate, leaving the peat almost dry. Weir confirmed the statements of Sands, and said that a dressing composed of one part of black peat and four of the ordinary kind, known as "wood-wool," had lately been employed by Brun and Czerny, and that he himself had used it with good result at the New-York Hospital. It is found to absorb thirteen times its weight. Weir added that he had seen the most brilliant results obtained by Schede of Hamburg, with the finest jute, allowed to remain on not longer than a week or ten days. Even in comparatively simple wounds, absolute rest was enforced. (*N. Y. Med. Jour.*, Nov. 10, 1883.)

In *Berlin. klin. Woch.*, May 14, 1883, 295, may be found an article by Brun, on "wood-wool" as a surgical dressing. This material is light, elastic, and very absorbent. It may be impregnated with an antiseptic if desired.

The Antiseptic Properties of Peat.—Gaffky has found that peat contains microscopic spores of mould, and numerous germs of fungi similar to oidium; also, isolated spores of bacilli.

Experimenting he found, that, in a mixture of peat and sterilized blood-serum, the bacteria of putrid blood, the spores of bacilli and of charbon, the micrococcus of Koch, and the bacteria of septicæmia, all propagated: the fluid became turbid, and an inoculation of the liquid speedily killed the animal.

He therefore concludes:—

1. That peat contains germs of inferior organisms, susceptible of being developed.
2. That it has no germicide power, and is not disinfectant.

3. That it, when mixed with a nutrient liquid, does not prevent the multiplication of bacteria.

4. But that it in certain cases, and to a certain point, lessens the proliferation of inferior organisms. (*Verhandl. der deut. Ges. für Chir.*, 1882; *Arch. Gén. de Méd.*, September, 1883.)

Trichlorated Phenol.—This compound, resulting from a mixture of phenic acid and chloride of lime, Diani says is fifteen times more energetic than phenol; it is more active than permanganate of potash, chloride of lime, thymol, salicylate of soda, bromic acid, etc.; and it is not an irritant. Salts, formed with a base, have the same antiseptic properties; one of them, the trichlorophenate of soda, being inodorous. (*El Siglo Medico*; *Lond. Med. Record*, Oct. 15, 1883.)

Phosphorus in the Treatment of Osteomalacia.—Busch reports two cases of osteomalacia treated by phosphorus. The first patient was a fairly healthy looking woman, thirty years of age, in whom the disease appeared a few weeks after childbirth. The objective signs were confined to the bones of the pelvis. This presented the appearance of having been pressed together from the sides. The symphysis projected forward like a beak, while the horizontal rami of the pubes were sharply bent. Walking was impossible, the patient being able only with the greatest difficulty to move from the bed to a chair. Absolute rest in the horizontal position was ordered to be maintained for three months, and Wegner's phosphorus pills were prescribed. After five months' treatment the patient was able to go up and down stairs without difficulty. At this time she changed her residence, and passed from under observation. The second case was that of a woman, fifty years of age, who complained of intense pain in the right arm, near the insertion of the deltoid muscle. A diagnosis of osteitis was made, and the ordinary measures were prescribed. No improvement was noticed, and after several weeks the patient abandoned the treatment. In about nine months she again came under observation. She was then reduced almost to a skeleton, was absolutely unable to walk, and was greatly deformed.

The dorsal spine was kyphosed, while the cervical spine was so strongly lordosed that the head seemed to rest between the shoulders. The thorax was distorted, the femora were bowed, and the pelvis presented the characteristic deformity of osteomalacia. The patient was confined to the bed for seven months, and took Wegner's pills for a year and a half. At the end of this time the bones were firm, and she could go about without complaint. The deformity was not decreased.

The following is the formula for Wegner's pills:—

B. Phosphori	0.025
Syr. simpl.	7.5
M. bene, et adde:—	
Pulv. glycyrrh. rad.	10.0
Pulv. gummi arab.	5.0
Gummi tragacanth.	2.5
Ft. pil. No. 250.	

Each pill contains about .0001 of phosphorus. The dose is one pill twice a day, to be gradually increased. Busch does not consider the drug to be of any value in rickets or caries. (*Centralbl. für klin. Med.*, Feb. 10, 1883; *N. Y. Med. Record*, April 14, 1883.)

Physostigma in the Night-sweating of Phthisis. By William Murrell, M.D., F.R.C.P.

On theoretical grounds it might be supposed that physostigma would be useful in the treatment of sweating. It is allied in its physiological action to jaborandi, pilocarpine, and muscarine; whilst it is antagonized by atropine, daturine, hyoscyamine, and bromatropine.

I have used physostigma and the salts of its alkaloid in the treatment of the night-sweating for nearly two years, and have notes of over fifty cases. Of these, thirty-three were males, and seventeen females. Of the adults, thirty-eight were between the ages of twenty and thirty-nine.

The oldest patient was forty-nine; the youngest was a girl of four. They were all suffering from phthisis. Their symptoms were cough, expectoration, hæmoptysis, loss of flesh, and night-sweating. All stages of the disease were represented: in some there was simply consolidation, others

had moist sounds over the chest, and in others again the indications of the existence of a cavity were apparent. The sweating was in every instance profuse. The only other medicine given was cod-liver oil.

Thirty-four of the fifty cases were treated by the physostigma itself in the form of the extract. In ten cases .006 was given in a pill at bedtime, and in eight of these the sweating was completely arrested by the fourth or fifth night.

In twenty-four cases the physostigma was given three times during the night, and this gave even better results. The dose is so small, it can be repeated frequently.

The sweating once stopped does not, as a rule, return for three weeks or a month; but at the expiration of that time it is usually necessary to resume the treatment. The hydrobromate, salicylate, and sulphate of eserine act equally well in doses of .001. In fifteen consecutive cases in which I used them, I had no failures. (*Practitioner*, December, 1883.)

Action of PicROTOXINE.—Chirone and Testa conclude that picROTOXINE may determine true epileptic attacks which are more intense when the psycho-motor centres are removed. It displays its action first on the bulb and on the parts connecting the cerebral and spinal centres, and then on the spinal centres themselves. It produces convulsions in frogs after the medulla is removed. (*Giorn. Internaz. delle Sci. Med.*, 1882; *Lond. Med. Record*, May 15, 1883.)

Piperidine and Conine.—Kronecker has shown that there exists a remarkable parallelism, physiologically and chemically, between these two alkaloids. Both paralyze nerves: piperidine the sensory, conine the motor nerves.

In .01 doses, the reflex motor power in the frog is paralyzed in ten minutes by piperidine. A dose of .001 notably lengthens the latent period.

It rapidly arrests respiration, and slows the heart. It acts on the terminal apparatus of the sensory nerves.

Conine paralyzes the periphery of the motor nerves, and later the central part. It excites the inhibitory cerebral apparatus. Convulsions are produced only in warm-blooded animals. The respiration is accelerated generally, and the

pulse slowed. (*Ueber die Wirkung des Piperidins und des Conins*. Fliess. *Arch. für Anat. und Physiol.*, p. 116, 1882; abstracted in the *Rev. des Sci. Méd.*, January, 1883.)

Piscidia.—Seifert uses a dry extract in .25–.50 doses. He has seen no sialagogue or sudorific effects; and the mydriasis has been trifling or absent, except after long employment of the drug.

In consumptives, it checks the night-cough. As an hypnotic it succeeded in a case of gastric dilatation, and in one of chronic nephritis. (*Extractum Piscidiæ als Hypnoticum*. *Berlin. klin. Woch.*, No. 29, p. 443, July 16, 1883; *Rev. des Sci. Méd.*, October, 1883.)

Pneumonia.—Kisseleff claims for the hydro-therapeutic treatment of pneumonia:—

1. A lessened mortality.
2. A fall of temperature, pulse, and respiration, for four or five hours daily.
3. An earlier crisis.
4. A more favorable issue of complications.
5. A more rapid convalescence. (*Wratch.*, Nos. 7, 8, 1883; *Rev. des Sci. Méd.*, October, 1883.)

Treatment of Psoriasis.—Greve (*Tidsskrift for prakt. Med.*, No. 16, 1881) says that iodide of potassium, in large doses, is a certain cure.

Pick (*Allgem. med. Central-Zeitung*, No. 17, 1882), to secure the good and avoid the bad effects of chrysarobine, has used a chrysarobine gelatine. (*Lond. Med. Record*, March 15, 1883.)

The Treatment of Psoriasis.¹ By Arthur Van Harlingen, M.D.

Psoriasis is one of the commoner skin-diseases met with in this country. The statistics of the American Dermatological Association show that it occurs in the proportion of about six per cent in all diseases of the skin encountered. Daily experience would seem to indicate a still more fre-

¹ Read before the Philadelphia County Medical Society, Oct. 17, 1883.

quent occurrence, because the affection is a disfiguring and annoying one, and therefore patients are more inclined to seek relief ; and also because it is a stubborn disease, and greatly prone to relapse. The history of a single case will often extend over many years, and bring it under the observation of a number of different physicians.

It is because of the comparative frequency with which psoriasis is met, and its stubbornness to treatment, that I have selected it as the subject of my remarks this evening. Having had a good deal of experience in the treatment of the commoner forms of the disease, it is my intention to confine myself chiefly to the consideration of such remedies as have come under my own observation and use, only touching incidentally on others.

The object of treatment in psoriasis is the removal of the eruption as it exists upon the skin. We cannot hope with any degree of certainty in any given case to prevent a recurrence of the disease, or, if you please, a relapse. For the drug has not yet been discovered which will surely take away all tendency to the recurrence of psoriasis ; and whoever promises a cure, in the wider sense of the word, to his patient, will, in a very great number of cases, find that he has been too sanguine. Fortunately, however, a certain number of patients do seem to recover. I do not know what has been the experience of others in this respect ; but I have patients who have been under observation three, five, even eight and ten years, without relapse. Such cases are, unfortunately, few.

Pre-eminent among the internal remedies which are useful in the treatment of psoriasis, is arsenic, which may justly be called a specific in this disease. I think I am not asserting too much, when I say that eight out of ten cases of psoriasis, of average character and severity, will do better under the use of arsenic than with any other remedy. I prefer Fowler's solution, given in the average dose of .25 cc. thrice daily. I think this solution is often prescribed in too large doses ; and I am sure the dose of .30 to .60 cc., as given in the books, is too large for ordinary use. Most patients bear a .25 cc. dose very well, but there are idiosyn-

crasies. I have sometimes been obliged to limit the dose at the beginning to .06 cc. in cases where subsequently such toleration has been established that .75 cc. have been taken with impunity. However, .25 cc. is a good dose to begin with; and if the effect does not begin to show itself within ten days or two weeks, the amount may be gradually increased. Fowler's solution should never be given to the patient in a phial, with the direction to drop out the requisite number of drops. The patient is apt to make a mistake, phials of different sizes may pour out more or less in each drop, and there is always danger in leaving a half-empty phial of poison about the house. The solution is better given mixed with water, or with wine of iron, or other convenient vehicle.

The effect produced by arsenic upon the eruption of psoriasis is, first, in diminishing the quantity of epidermic scales thrown off, and then in preventing the appearance of new lesions. The patches gradually lose their scaliness, begin to heal in the middle, and disappear little by little. It must be remembered, however, that arsenic is a slowly acting remedy; and its use should be continued through many months, to get the best security against relapse.

The other liquid preparations of arsenic used in psoriasis are Pearson's solution of the arseniate of sodium, and Donovan's solution of the iodide of mercury and arsenic. I have used the former in a few cases, without noticing any perceptible difference, as regards efficiency, between it and Fowler's solution. The solution of mercury and arsenic (Donovan's) I have employed in certain stubborn cases, with good effect, where Fowler's solution has seemed to fail. The existence of syphilis as the cause of the eruption in these cases having been excluded, I am at a loss to account for the apparently greater efficacy of the mixed treatment. The dose given was as much as ten drops; and although this solution is weaker in arsenic than Fowler's, yet I am inclined to the opinion that the conjoint administration of the two drugs, mercury and arsenic, was the cause of the good result, rather than the increased dose. I should be inclined to use Donovan's solution in cases where Fowler's solution had failed.

The mixture of arsenious acid, black pepper, and sugar of milk, known as Asiatic powder, and recently placed in the Pharmacopœia with the pepper left out, among the triturations, is of no particular value above the other preparations; and it is not so convenient of administration.

Hypodermic injections of solutions of arsenic have been employed in the treatment of psoriasis, but I have had no experience in their use.

Next in value to arsenic, in the treatment of psoriasis, is iron. I commonly employ the tincture of iron in cases where arsenic does not seem indicated. There is one type of psoriasis which includes robust, rosy, well-nourished individuals, "the very picture of health." Such people have never been sick a day in their lives, or perhaps may have had slight attacks of articular rheumatism. Such patients do well under arsenic.

But there is another type in which the individual is thin, poorly nourished, and perhaps somewhat anæmic. These are the cases which do well under iron, which is best administered in the form of the tincture of the chloride. With these two remedies, arsenic and iron, I usually succeeded in curing ordinary cases of psoriasis, adding in rare cases cod-liver-oil to the use of the tincture of iron when debility is present. Of course local applications are employed at the same time: of these I shall speak presently.

In addition to the internal remedies mentioned, quite a host of others have been employed from time to time. Such are tar, carbolic acid, copaiba, phosphorus, tincture of cantharides, tincture of maize, carbonate of ammonia, acetate of potassium, and other diuretics; the alkalies, as liquor potassa and the alkaline mineral waters. Of these, I have found alkalies and diuretics useful in cases where a markedly inflammatory condition of the skin has existed. The other remedies I have not employed; nor do I think the reports of their usefulness based on a sufficient number of facts, except in the case of tar, possibly, to make it worth while to try them.

Equally important with the internal treatment of psoriasis is the external management of the disease. It is, of course, desirable to remove the eruption as soon as possible, wherever

it may be situated ; but, when it is found upon the face, there is every reason to endeavor its cure by all means, and in the shortest time. External and internal treatment should therefore be combined when practicable. The first thing to do is to remove the scales. This may be done by means of local or general baths, wet dressings, etc. ; or by inunctions with fats and oils, by the use of soap, or by the action of impermeable dressings of India-rubber or oil-silk. When only a few lesions are to be acted upon, a solution of salicylic acid in alcohol, one part to sixteen, well rubbed in with a sponge, will remove the scales very nicely.

The scales having been removed, the next thing is to apply such substances to the diseased patches as may most quickly modify the abnormal condition of the skin, and bring it back again to a healthy condition.

An innumerable number of applications have been recommended for this purpose, the most of which I shall pass over with only a mention. Such have been soaps and alkalies, citric and hydrochloric acids, sulphur, iodine, and mercury, alone and in combination, together with the various forms and preparations of tar, creosote, and carbolic acid.

All of these remedies have their uses ; and most of them, especially the tarry preparations, I have employed time and again, in years gone by, and with moderate satisfaction. The introduction, however, of chrysarobine or chrysophanic acid, some six or seven years ago, put quite a new phase on the local treatment of psoriasis ; and since then, with the aid of this and other later discoveries, we are able to work a much more rapid change in the appearance and condition of the skin in this disease.

As chrysarobine is perfectly well known to all here present, both as to its advantages and defects, I shall say but little about it in the ordinary form of its application ; namely, as an ointment. When it first came out, I tried it quite extensively ; but its disadvantages seemed so great, that I had already begun to restrict its use greatly in my practice, when a new agent appeared, which for every-day use has in my hands, until very recently, almost entirely superseded all other local applications. I refer to pyrogalllic acid.

I do not think that pyrogallic acid is by any means so well known as an application for the relief of psoriasis as is chrysarobine. If I may judge by the infrequency with which its virtues are mentioned in the journals (although I believe all recent text-books speak of it), it is not in general use. But it is, in my opinion, one of the very best remedies we have for the cure of cases of psoriasis of average severity. Employed in the form of ointment, of the strength of 2. to 4. of the pyrogallic acid to 30. of simple ointment, the effect produced by it is almost as rapid and decided as that brought about by chrysarobine, without the accompanying discoloration. A slight blackish staining is all that is produced; and the ointment can even be employed in the scalp without markedly discolorizing the hair, if applied cautiously. It is desirable, however, not to apply soap or alkalis at the same time, because this causes a more permanent and deeper stain.

Pyrogallic acid cannot be used in extensively generalized psoriasis, when large surfaces are affected by the disease, without a certain amount of danger from absorption, as indicated by strangury and olive-green or tar-colored urinary sections. With care, however, and the occasional suspension of the remedy for short periods, I believe this remedy could be employed, even in universal psoriasis, with good effect.

One more external application in psoriasis remains to be spoken of; namely, naphthol. This drug, a derivative of coal-tar, was introduced into use several years ago, by Kaposi of Vienna, as a sort of substitute for carbolic acid. He recommends it very highly in psoriasis, in the form of ointment, about 5.20 to 30.; and I have used it in this and other strengths, and also in alcohol and oil, with fairly good effect.¹

Naphthol is not so active in its effect as chrysarobine or pyrogallic acid; but it is much more agreeable, and is, I think, peculiarly well adapted for employment upon such

¹ In a communication read before the American Dermatological Association last month, and published in the American Journal of the American Sciences for October, I have given the results of my experience in the use of naphthol in various diseases of the skin, psoriasis among the number. I may refer to that paper for further details as to the action of the drug in this disease.

parts as are exposed to the view, — as the face and hands. Like pyrogallie acid, it must be used with caution over large surfaces, as absorption with toxic effects may be produced.

It remains to mention briefly two or three methods of application of these remedies which have recently been brought forward. The first of these is the treatment by medicated gelatine, which was introduced by Professor Pick, the well-known dermatologist of Prague. My attention was first drawn to this by a pamphlet which Professor Pick kindly sent me, in which he gave an account of his earlier experiments with medicated gelatines; but I have not as yet had an opportunity of testing this method of medication as I should desire. I may say, however, that the method does not seem to me calculated to prove convenient and popular in private practice. I had for some time been making some experiments in my service at the Polyclinic in the preparation of gelatines impregnated with chrysarobine and pyrogallie acid, but without much satisfaction, when Mitchell, the well-known pharmacist of this city, sent me some excellent preparations of his own, which seem to be perfectly adapted to the purpose for which they are intended. A bit of one of these gelatine sticks is cut off, and placed in a water-bath, where it soon melts into a clear homogeneous fluid, which may then be applied to the lesions of the skin by means of a paint-brush. The advantages claimed are cleanliness and transparency. The coating of gelatine does not rub off on the clothes, and is therefore not so dirty as an unctuous application. A fresh coating can be painted on every day or two as the old layer wears off. The chief disadvantage of this method of treatment is, that it requires apparatus which is not convenient to carry about, nor can the patient be trusted to employ it at his discretion. My own experience is, that in psoriasis, at least, the gelatine applications are not active enough. I have not, however, used them with sufficient frequency to pronounce a positive opinion.

Recently a solution of chrysarobine in collodion has been recommended in the treatment of psoriasis, by Fox of New York; and several dermatologists have confirmed his state-

ments with regard to its efficacy. I have employed this preparation in one or two instances; but it has seemed to me so much less active than the chrysarobine ointment, that I have not been encouraged to continue its use. It has one great advantage over the gelatine applications, however; and that is, that it can be applied extemporaneously, and without the paraphernalia which must accompany the use of the gelatine.

A few weeks since, a pamphlet by Auspitz of Vienna reached me, in which that distinguished dermatologist recommended liquor gutta-percha as a vehicle for the application of chrysarobine. I at once obtained a ten-per-cent solution, or rather emulsion, of chrysarobine in liquor gutta-percha; and, happening to have a case of psoriasis of the face and scalp under treatment, I gave some to the patient to apply once daily. The effect was so happy as to encourage me very much to hope that we have in this preparation the most convenient method of applying chrysarobine yet devised; and as chrysarobine is, after all, the most efficient local agent in the treatment of psoriasis yet brought forward, I have no hesitation in urging the trial of this preparation on any one who may have a case of psoriasis under treatment. It is to be noted, however, that the same watch must be kept upon the skin, for fear of exciting dermatitis, as when the ointment is used. Only when the liquor gutta-percha dries, which it does very quickly, there is little or no danger of rubbing the chrysarobine over the good skin; nor is there much danger, if any, of staining the clothing. (*Four. Am. Med. Asso.*, November, 1883.)

Epidermic Administration of Purgatives.—Mya and Vandoni, noticing that a person rubbed with castor-oil had unusual looseness of the bowels, experimented with the glucocides which Hiller used in his hypodermic injections.

Aloine was used, and the vehicle employed was glycerine or vaseline. The dose used was 1.-2.

A warm bath was taken; and, with vigorous friction over the whole body, the mixture was absorbed, causing very little local irritation. In all cases this procedure was followed

sooner or later by evacuations varying in number and amount. (*Gaz. degli Ospitali*, No. 70, 1883; *Bull. Gén. de Thérap.*, Nov. 15, 1883.)

Pyrogallic Acid. — Jarisch says pyrogallic acid has anti-septic properties, and destroys fungoid growths. After washing off the scabs of psoriasis, he applies a 5-10 per cent ointment with a brush once or twice a day. Slight erythema usually follows the application of the ointment; and when this ceases the application may be omitted, and the surface dusted with starch-powder. Favus and eczema marginatum yield rapidly to the remedy. Eczema is prone to return. (*Centralbl. für die Ges. Therap.*, January, 1883; *Lond. Med. Record*, Feb. 15, 1883.)

Vidal recommends pyrogallic acid as an ointment with vaseline, or in a powder with starch, in the treatment of chancroid and phagadenic buboes. Such an application should be made morning and night for three or four days, and the slough formed should be removed.

The preparation should be fresh, and must be kept from light and moisture in a well-stoppered bottle. (*Gaz. Méd. de Paris*, March 24, 1883.)

Vidal, at the end of an article advocating the use of this drug in phagadenic or other chancroids, gives the following conclusions:—

1. Pyrogallic acid, or pyrogallol, destroys the virus of a chancroid, stays the erosion and sloughing, and transforms it speedily into an ordinary sore.

2. It only causes moderate pain for a few minutes, limits almost exclusively its caustic action to the diseased tissues, and is easy of application.

Pyrogallol incorporated in a pomade or mixture (1-5) with an inert powder seems to be the best form for topical use.

3. No toxic effects follow its application to large phagadenic ulcerations.

4. It has apparently no effect on syphilitic ulcerations. (*Traitement du Phagédénisme du Chancré simple par l'Acide Pyrogallique, ou Pyrogallol.* Par M. E. Vidal. *Bull. Gén. de Thérap.*, Jan. 30, 1883.)

Quassine.—The amorphous and crystalline act alike. Given to a healthy man, it produces a rapid improvement in appetite and digestion, and consequently greater strength. In doses of .04 before meals, besides increasing nutrition, it relieves constipation caused by atonicity of the muscular coat of the intestine. A patient with an ordinary diarrhœa gets relief in a few days by using the same doses. Experiments show it to have some diuretic properties, while it augments the secretion of the liver, kidneys, mammary and salivary glands. It is a bitter tonic, aperient, and stomachic, which, while not advisable in acute diseases, is very useful in general debility, atonic dyspepsia, anorexia, chlorosis, spasmodic vomiting, slow convalescence, particularly that from fevers. In ordinary doses it is poisonous to the oxyuris and ascaridis. (DÉLMIS, in *L'Union Méd.*, Jan. 20, 1883.)

Quebracho.—Larion concludes:—

1. That white quebracho causes a slowing of respiratory and cardiac movements;
2. That it acts principally on the circulatory centre, strengthening and regulating the cardiac contractions;
3. Its action is prompt;
4. It is manifestly anti-dyspnœic;
5. It seems to affect nervous dyspnœa, and that from acute organic affections, about alike;
6. In dyspnœa from abdominal affections, it appears less efficacious;
7. In doses of .50 of the extract, it is not dangerous, and seems to have no effect on other organs. (*Bull. Gén. de Thérap.*, July 15, 1883.)

Quebracho and its Alkaloids.—Huchard and Eloy have made a special study of aspidospermine, one of the alkaloids of quebracho.

It amplifies the respiratory movements, and quickens them. After large doses the venous blood turns bright red, vermilion, and the temperature falls from 39° to 36°. The mixed alkaloids, which exist in the residue left after the extraction of the aspidospermine, have different physiological effects.

Death ensues in 3-6 minutes after giving 3-5 drops of a four-per-cent solution.

The temperature rises a degree, or a degree and a half, convulsive twitchings set in, the respiratory movements lose their rhythm and amplitude, and the animal dies of asphyxia.

The blood is dark, and the lungs are studded with dark ecchymoses. (*Les Propriétés physiologiques, thérapeutiques, et toxiques, des Alkaloides du Quebracho Blanco.* Par MM. Henri Huchard et Ch. Eloy. *L'Union Méd.*, June 7, 1883.)

Notes on the Administration of Quinine. — David Young summarizes his article by advising never to give quinine in antipyretic doses when the bowels are confined and the secretion of urine is scanty. In many cases of remittent and intermittent fevers, the combination of the drug with chloride of ammonium or a salt of potash or soda is likely to be more easily tolerated, as well as more useful, than if it be administered in a pure form. During its administration, should a headache come on or increase in intensity, the case requires the most careful attention. (*Practitioner*, October, 1883.)

Extravasations of Blood into the Labyrinth, produced by Quinine and Salicylic Acid. — Experiments made by Kirchner of Würzburg, on animals, have demonstrated to him that the auditory troubles supervening on the ingestion of large doses of quinine and salicylic acid are produced by extravasations of blood into the various parts of the ear.

The functional disturbances are especially grave when the exudation is into the labyrinth; in the middle ear, less marked and later symptoms are produced, and the prognosis is always more favorable.

Beside the anatomical lesions of the mucous membrane of the tympanum, — red color and slight reddish-yellow exudation, with considerable engorgement of the vessels, — Kirchner has observed hyperæmia, and hemorrhage into the labyrinth, in the animals upon which he experimented. In the brain and on the internal face of the skull, there was considerable engorgement, notably at the level of the temporal bone; the vessels of the dura and pia mater were

markedly engorged. The nervous substance presented no important modifications.

With the microscope, one can see, in the case of animals subjected to these experiments, a marked vascular injection with hemorrhagic extravasations, both into the cochlea and the semicircular canals. The small nerve-filaments subjacent to the fibres of the canal appear, under these circumstances, to undergo equally profound alterations in their structure and function.

Kirchner gives the history of a case of deafness and cephalalgia, caused by salicylic acid, with vertigo, and difficulty of walking straight. Paracentesis and frequent injections of air caused these symptoms to disappear rapidly, with the exception of a slight deafness on one side. (*Annales des Mal. de l'Oreille, du Larynx, etc.*, No. 4, 1883; *Med. News*, Oct. 13, 1883.)

The Effect of Quinine and Salicylic Acid on the Ear.

—Kirchner (*Berlin. klin. Woch.*, p. 49, 1882) has studied the effects on the ear of those medicaments which cause dulness of hearing, tinnitus, etc. He finds that quinine and salicylic acid cause hyperæmia of the membrana tympani, and of the whole labyrinth; and this congestion may be so intense as to cause hemorrhagic extravasations. In this position, Kirchner is in accord with Roosa of New York, who, as is well known, maintains that quinine has a very injurious action on the ear and eye, by reason of the vaso-motor paresis and consequent hyperæmia.

There are, however, two sides to this question. Thus Weber-Liel, in connection with Gruber, has experimented on adult males with gram doses of quinine. They have ascertained that the temperature of the external auditory canal has been lowered, as also the general temperature of the body. They have not observed any hyperæmia of the membrana tympani or other parts of the ear: on the contrary, they have witnessed in five cases the disappearance of a slight degree of hyperæmia, which had existed previous to the administration of the quinine. They ascertained, also, that the maximum degree of impaired hear-

ing was coincident with the greatest decline in temperature.

These observations, so exactly opposed, can be reconciled only by reference to the effect of the dose. Unfortunately, this important factor has been often overlooked. The quantity administered has an unmistakable effect on the results produced. This action may be formulated in a single sentence: Small doses stimulate the circulation; large doses slow the heart, and raise the tension. Small doses of quinine cause hyperæmia of the ear: large doses have the opposite effect, causing contraction of the vessels, and anæmia. The importance of this distinction is most obvious. As all the world knows, quinine is not the only remedy acting thus: opium, pulsatilla, ipecac, etc., similarly differ in effects according to the quantity administered.

There are other facts which throw a brilliant light on this question. Large doses of quinine, as Knapp and others have proved, cause a marked degree of anæmia of the retina, so that, finally, only the largest vessels remain visible. As these cases usually recover, the condition of the retinal vessels must be that of strong contraction. (*Med. News*, May 5, 1883.)

Resorcine. — Resorcine is a hydroxyl derivative of benzine, very soluble in water (95–100) ether, alcohol, glycerine, and vaseline. Aqueous solutions turn more or less brown on exposure to the air in proportion to their strength. The solution is neutral.

It has the same properties as carbolic and salicylic acids. In one-per-cent solution it stops fermentation, and in 1.5 per-cent solution prevents putrefaction.

In doses of .30–.60 per kilo. of body weight, it produces tremors, clonic convulsions, and acceleration of respiration and pulse, all disappearing in an hour. Sensibility and consciousness remain unaffected.

On giving .60 per kilo., intense vertigo and loss of consciousness supervene; sensibility is dulled; clonic convulsions are violent, frequent, and confined to the anterior half of the animal. Pulse and respiration greatly accelerated. Tem-

perature not altered. The animal is himself in one or two hours. From .90 to 1. per kilo. kills in thirty minutes; death being preceded by the phenomena already related, much less marked in the extremities. There is a tetanic contraction of the muscles of the back of the neck. The temperature gradually, and without exception, rises to 41° C. at the moment of death. It coagulates albumen and the white of egg, and in concentrated solution is caustic. It is rapidly eliminated by the urine. It can be safely given hypodermically, and makes a useful local derivative. (Extract from *Manuel des Injections sous-cutanées*. Par Bourneville et Bricon. Abstracted in *Prog. Méd.*, May 19, 1883.)

Cattani admits its rapid antipyretic action; but asserts it is ephemeral, and has no influence on the progress of enteric fever, pneumonia, or facial erysipelas.

He finds it useful in gastric catarrh as an anti-fermentative agent, provided the stomach be washed out, as Andeer advises; and useful to febrile attacks of miasmatic origin.

It diminishes the size of the liver and spleen, but not invariably. It is less poisonous and corrosive than carbolic acid, and is well tolerated in the digestive tract, and as a hypodermic injection. Sometimes it produces vertigo, tinnitus, congestion of the eyes, and vomiting. (*Gaz. degli Ospitali*, 1882; *Rev. des Sci. Méd.*, October, 1883.)

Surbeck thinks resorcine, on the whole, inferior to quinine or salicylic acid, as an anti-pyretic. The fall of temperature, secured by its use in typhoid-fever, is only temporary; and its cerebral effects are easily produced, and similar to those of quinine. (*Ueber die fieberwiedrige Wirkung des Resorcins*, u. s. w. Von Victor Surbeck. *Deut. Arch. für klin. Med.*, Band xxxii., Heft 5, 6, p. 515, 1883; *Rev. des Sci. Méd.*, July, 1883.)

Righi thinks resorcine is well borne in man, but often induces vertigo, tinnitus aurium, and reddening of the face, rarely a sense of weight or burning in the stomach. Copious sweating for two hours, and darkening of the urine, usually follow its administration. It does not stain the linen, nor has it a bad smell.

4-5. daily in divided doses, he says, prevents malarial at-

tacks, and destroys the infection. It reduces recent splenic tumor.

In typhoid-fever, pneumonia, and erysipelas, it lowers the temperature, but does not otherwise affect the disease. In acute gastric catarrh, in small and repeated doses, with bicarbonate of soda, it is of the greatest value. In gonorrhœa and conjunctivitis it is very useful. (*Ann. Univ. di Med.*, July, 1883; *Lond. Med. Record*, Dec. 15, 1883.)

Cattani finds resorcine heals wounds with great rapidity, scrofulous, syphilitic, phagedenic, and varicose ulcers. He employs a 50-70 per cent solution, or incorporates in glycerine or vaseline.

Equal success attends the employment of a one-per-cent solution as an injection in gonorrhœa, acute and chronic cystitis.

Mannino¹ employs resorcine in the treatment of epitheliomata of the skin and mucous membrane. He uses inunctions of a mixture (1-10) with vaseline. The destructive action of the resorcine seems to completely check the development of cutaneous neoplasms, and the cauterization causes no pain. (*Prog. Méd.*, Sept. 1, 1883.)

Chéron says, besides its being a powerful antiseptic, it is astringent; and, in strong solution or powder, it is caustic.

When, in a case of purulent vaginitis, the pain is so great that no speculum can be introduced, Chéron introduces a long elastic catheter to the bottom of the vagina, and three times a day irrigates it with a one-per-cent resorcine solution. Under this treatment the discharge ceases, and the tenderness disappears. Then tampons, smeared with the glycerite of resorcine (1-10) are used, the tampon remaining in place twelve to fifteen hours, and being renewed every second day. (*Rev. de Thérap.*, June 15, 1883.)

Leblond and Fissiaux say that resorcine, in the treatment of simple chancre, is superior to iodoform. It has no odor, is free from toxic effect, produces only slight pain, and heals the sores on the average in twenty-three days; while the average time occupied by the iodoform treatment is thirty-eight days. (*De l'Émloi de la Résorcine dans le Traitement*

¹ *Giornale Ital. dell. Mal. Ven. e della pelle*, 1882.

du Chancré Simple chez la Femme, Paris, 1883; abstract in *Prog. Méd.*, April 28, 1883.)

Resorcine in Whooping-cough. — Moncorvo considers the parasitic origin of pertussis as established, and believes that resorcine is the proper germicide. Indeed, its parasitic origin now scarcely admits of a doubt, since Burger of Bonn published his conclusions, which were: that (1) the bacilli were only encountered in the sputum of patients affected with whooping-cough; (2) they appeared in such quantities in the sputum of these patients, that their influence could not be doubted; and (3) the intensity of the case was in direct proportion to the abundance of the *leptothrix buccalis*. The experiments and examinations of Moncorvo and Araujo fully confirmed Burger's conclusions.

Having satisfied himself as to the origin of whooping-cough, Moncorvo concluded that the most effectual therapeusis was a local application to the laryngeal mucous membrane; and, in view of its non-irritating qualities, resorcine seemed to be peculiarly adapted in these cases. It should be used in an aqueous solution of one per cent, and applied to the epiglottis and larynx by means of a camel's-hair pencil well curved, and suitable for introduction into the larynx. Contrary to what would be expected, the application is not irritating to the larynx, nor does it bring on a paroxysm of cough, except at the first one or two applications. The taste and odor, not being disagreeable, increase its value for this purpose. It is, as we know, harmless when given internally to very young children, even in large doses. It is important that a pure article be used; pure resorcine is very white, and occurs in the form of crystalline needles of silvery brightness. Besides the fourteen cases reported in detail, he has successfully treated twenty other cases with it, some very obstinate, and complicated by hereditary syphilis, intermittent fever, threatened hydrocephalus, etc. Of the fourteen cases of which detailed reports are given, many are interesting on account of the rapidity with which the application caused the disease to disappear; in eight cases, variously complicated by hereditary syphilis,

intermittent fever, marasmus, diarrhoea, and pulmonary tuberculosis, the disease had entirely disappeared in six weeks. In fact, of these cases, only two remained uncured at the end of four weeks; some being completely cured in one and two weeks.

From these facts he feels justified in concluding:—

1. That whooping-cough, whose nature and genesis, up to a very recent period, have been variously interpreted, may now, on account of recent microscopical observations, be classed among the parasitic diseases.

2. That the disease appears to be due to the presence of micrococci, which multiply with great rapidity in the hyperglottic region of the larynx, infiltrating the epithelial cells, which cells appear to be the elective seat of their development.

3. That resorcine, applied directly to the laryngeal mucous membrane, caused, in every case in which it was employed, rapid decrease in the number of the paroxysms, marked decrease of their intensity, and recovery in a short time without the aid of other medication. (*União Medica*, March, April, and May, 1883; *Am. Jour. Med. Sci.*, October, 1883.)

Platt summarizes his experiments to test the antiseptic power of resorcine as follows:—

The development of bacteria in urine is not prevented by one-fourth per cent of resorcine, and three-fourths per cent deterred their development to four days; while one-fourth per cent of carbolic acid hinders the development of bacteria eighteen days. When once formed, the bacilli can only be killed by very large amounts of either antiseptic, but their increase is prevented.

In none of the animals poisoned with resorcine was the urine discolored.

The action of resorcine on six warm-blooded animals was as follows:—

1. Restlessness and trembling.

2. Rapid respiration very early in both rabbits; early and very marked after a lethal dose in one dog, later after a lesser but fatal dose in another, not marked after non-lethal doses.

3. Staggering, unsteady gait, loss of co-ordination especially in hind limbs, present early in all the animals excepting one rabbit, where small doses exhibited.

4. Twitching of muscles, especially of hind-limbs, constant in all.

5. Clonic contraction of nearly all flexors and extensors of body, more especially of those attached to the pelvis and shoulder.

6. In the animals that died, the imitation of the natural running or hopping movements before death, as the animal lay upon its side, was striking. (*Some Observations on the Antiseptic and Physiological Action of Resorcine.* By W. B. Platt, M.D., Baltimore, Md. *Am. Jour. Med. Sci.*, January, 1883.)

Vicenzio Patella says, that in 2.-6. doses, in solution, by the mouth or rectum, resorcine is especially useful in remittent and intermittent fevers. Lichtheim considers it a "specific" in malarial fevers and splenic enlargements. In infant diarrhoea, it has given very good results in doses of .10-.30 in 60 cc. of water. For external use, it is hardly at all poisonous, has no bad smell, and no causticity as has carbolic acid, for which it is used as a substitute. (*Gaz. Med. Ital. Prov. Veneto*, Oct. 14, 1882; *Lond. Med. Rec.*, Feb. 15, 1883.)

The Treatment of Acute Rheumatism by Blisters.—Kinnicutt has made a trial of the treatment recommended by Harkin¹ for acute rheumatism; this treatment being on the idea that acute rheumatism is "a specific form based on the idea that acute rheumatism is "a specific form based on endocarditis of neuropathic origin, generally allied with myocarditis."

Kinnicutt tried the treatment in four consecutive cases of acute rheumatism, and in one case of gout.

After a careful examination of the patient, a blister sufficiently large to cover the entire cardiac area was applied, and allowed to remain until a very copious serous discharge was obtained. The blistered surface was then dressed, and

¹ *Dublin Journal of Medical Science*, October, 1881; *British Medical Journal*, Sept. 23, 1882.

a second blister applied as soon as the condition of the skin permitted. The discomfort caused was not great. No internal medicine was given, except small doses of opium occasionally at night.

A critical study of the cases reported fails to demonstrate, according to the author, the efficacy of large blisters, applied over the precordium, to affect the endocarditis, or to modify the arthritic symptoms or the degree and duration of the pyrexia. (*N. Y. Med. Record*, Dec. 8, 1883.)

Treatment of Ringworm.—Rabitsch (*Wien. med. Woch.*, No. 14, 1882) has used with success a ten-per-cent solution of salicylic acid in alcohol in the treatment of eczema marginatum, tinea circinata, and pityriasis versicolor.

Smith (*Br. Med. Jour.*, December, 1882, p. 1195), in a large outbreak of ringworm in a school, cured most of the cases by Coster's paste, acetic acid, or by the compound ointment of carbolic acid, citrine ointment, and sulphur. Some cases resisting this yielded to the oleate of mercury, while some rebellious stumps and patches were treated with croton-oil.

Klink of Warsaw (*Pamiętn. tow. Lek. Warsz.*, vol. lxxviii.) recommends an ointment or alcoholic solution of from 1–15 per cent of beta-naphthol as a remedy in ringworm and other parasitic diseases. (*Lond. Med. Record*, March 15, 1883.)

Uses of Salicine.—Korczynski thinks, that, in malarial affections, salicine is indicated, (1) in cases of idiosyncrasy to quinine; (2) in obstinate cases, where even large doses of quinine are useless; and (3) in cases where there are gastric disturbances, whilst the subcutaneous or rectal administration is impossible. (*Przegl. ad Lek.*, 1882, Nos. 9–13; *Lond. Med. Record*, April 15, 1883.)

Salicylate of Soda in Diarrhoea.—Calleza says putrefaction of the contents of the alimentary canal causes most diarrhoeas. He thinks salicylate of soda prevents this putrefaction, without interfering with the normal digestive processes, and that a putrid odor of the stools is an indication for its administration.

Two or three doses of 1. each will cure most idiopathic cases. It is less efficacious, but still useful, in other forms of the complaint. (*Lyon. Med.*, May 20, 1883; *Lond. Med. Record*, Oct. 15, 1883.)

Action of Sodium Salicylate on the Heart.—Maragliano of Genoa examined, with the sphygmograph, patients who were taking the salicylate regularly, before, during, and after the exhibition of the morning dose; and found, as the dose was increased, the pulse became stronger, and the systolic line of the trace higher.

He also took traces before and after a single 5. dose, and found the systolic line began to grow in an hour, reached its maximum in two to three hours, and disappeared in five. The traces were abnormally dicrotic and often tricrotic.

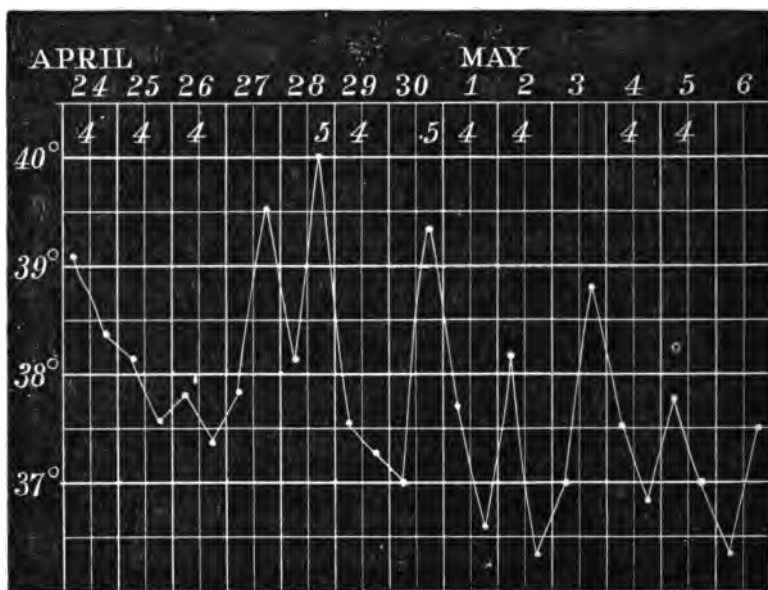
By Basch's method, he found the arterial pressure rose about an hour after a 5. dose, and returned to the normal in about three hours. The rise in pressure was from 10–20 mm. of mercury. These results show that, at least, sodium salicylate does not depress the heart. (*Centralbl. für Med. Wiss.*, Dec. 2, 1882; *Practitioner*, January, 1883.)

Salicylate of Soda in Phlegmasia Alba Dolens.—Vigar has treated three cases of milk-leg with 4. doses of salicylate of soda daily, with the best results. From the first day, there was a notable diminution of the fever and œdema. None of the patients were confined more than twenty-one days to bed, while a case not so treated was bed-ridden two months. No œdema, nodosities, or thickening of the lower limb, remained. (*La Correspondencia Medica*; *Lond. Med. Record*, Nov. 15, 1882.)

Sodium Salicylate in Typhoid Fever.—Collard advises cumulative doses of salicylate of soda in the treatment of typhoid-fever. In this way, he finds the evening temperature is generally lower. On omitting the drug, the evening temperature rises. Most of the symptoms improve with the fall of temperature: the diarrhœa persists. Profuse perspiration comes on two hours after the drug is given, and continues for a long time.

He has not seen any ill effects. One of his cases was a girl of nineteen; was admitted to the hospital, April 15, with the temperature of 40.5° . From the 16th to the 22d, the patient had large doses of the sulphate of quinine. The temperature oscillated from 39° in the morning to 40.5° at night. The disease was worse: the tongue became dry, the stupor increased, and delirium set in.

On the 23d, at the morning visit, the temperature was 39.5° . 4. of the salicylate were ordered to be taken between noon and two P.M. The evening temperature was 38.6° : the general condition was notably improved. Sleep supervened without delirium. The following chart shows the subsequent course of treatment. The figures in the chart denote grams of the drug, and are placed so as to indicate the hour when given.



The patient made a good recovery. Emaciation was very marked. (*Fièvre typhoïde: Traitement par le Salicylate de Soude à Doses accumulées.* Par M. Collard (de Liège). Abstract in *Prog. Méd.*, Aug. 18, 1883.)

Salicylic Acid is recommended by Könhorn for the night-sweats of phthisis, in the following powder: salicylic acid 3., starch 10., chalk 75. The entire body of the patient is dusted with this powder at bedtime.

The same powder is employed in the Austrian army in sweating of the feet. (*Memorabilien*, Nov. 15, 1882; *N. Y. Med. Record*, Jan. 27, 1883.)

Salicylic Compounds in the Treatment of Acute Rheumatism.—Kinnicutt says continued careful personal observation of the effects of salicylic compounds may be briefly summarized as follows:—

First, In controlling the arthritic symptoms (pain, etc.) and the pyrexia of acute rheumatism, they may still be considered as constituting the most successful of all hitherto suggested methods of treatment. Their marked effect upon the pyrexia cannot be explained by their well-known antipyretic power alone.

Second, While controlling the arthritic pains and pyrexia, they seem incapable, in many cases, of wholly destroying the rheumatic virus, as is shown in the subsequent development of endocardial and pericardial affections, and inflammations of other fibrous and serous textures.

Third, Further proof is needed of a more frequent implication of the endocardium and pericardium under the administration of the various salicylic compounds than under any hitherto advised treatment.

Fourth, The most efficient, if not essential, mode of their administration, is in frequently repeated doses (every two hours), that the economy may be kept continuously under their influence: they should be continued in the initial doses during the first ten days of the disease, and given in very gradually diminished amount during the patient's entire convalescence.

Fifth, Their possible anæmic effects may be rationally combated by the use of iron salts before or with the beginning of convalescence.

Sixth, A continued experience with the salicylic compound contained in the oil of wintergreen, in the treatment

of a large number of cases of acute rheumatism, confirms the favorable opinion,¹ expressed a year ago, of its efficiency and other desirable qualities. An efficient dose is 10–12 cc. daily. (*N. Y. Med. Record*, Dec. 8, 1883.)

Sculptor's Clay.—Sokoloff (following Pirogoff) has for ten years used sculptor's clay as an external remedy in various ailments. It is a popular remedy in Russia, moistened with vinegar, as a local refrigerant in fever, and to calm hysterical pains.

Botkine has observed its calmative action in the painful epigastric pulsations of hysterics, the nausea and diarrhoea also disappearing.

Sokoloff and Drosdoff claim it exerts a beneficial effect on aneurisms. (*Troudy obch. Roussk. Wratch. w. s.*, Peterb., 1882; *Rev. des Sci. Méd.*, October, 1883.)

Hyposulphite of Soda.—Leviez gives 4–5. a day in cases of fetid bronchitis. The expectoration becomes less fetid and gray, and more mucous. The general condition improves, the appetite and the strength return.

Its action is slow, and sometimes a week elapses before any improvement is manifested.

A recent case yields more readily than one of long standing. According to Polli, it acts as an "anti-putrid" by taking away the oxygen necessary to fermentation. (*De la Bronchite fétide et de son Traitement par l'Hyposulfite de Soude*. Par Leviez. *Thèse de Paris*, 1883.)

Action of Medicines on the Solar Plexus.—Leven says the sulphate of magnesium does not produce osmosis. It reddens the mucous membrane of the digestive tract, causes the excretion of 250. of liquid in the intestine of a dog, and in doses of 40. congests all the viscera. The intestinal flux is composed of water and the chloride of sodium, i.e., two elements of the blood. Saline purges produce a catarrh of the mucous membrane, and cause vasomotor paralysis.

Colocynth, in doses of .50, in two hours reddens all the digestive tract, causes hemorrhages in the sub-mucous

¹ *N. Y. Med. Record*, Nov. 4, 1882.

cellular tissue, mucous ulcerations, increased muscular contractions of the stomach and intestines, and causes an out-pouring of an alkaline liquid composed of water, chlorides, albumen, leucocytes, and red globules, and irritates all the viscera more than salines.

The writer thinks that drastics have no isolated action on this or that viscus (as cholagogue, for example), but that they affect all viscera unfavorably, are very dangerous agents, and should not be used therapeutically.

Four grams of ergot produce, in a dog, a catarrh and increased muscular contractions of the stomach and bowels, and congestion of the viscera; but it produces no diarrhoea, thus showing that neither catarrh, irritation of the mucous membrane, nor increased peristalsis, necessarily causes diarrhoea. Opium in large doses at first renders anæmic the gastro-intestinal mucous membrane: in two hours a catarrh with increased peristalsis comes on, but no diarrhoea.

On using opium many days, there appears a small amount of liquid similar to that produced by drastics.

For these and other reasons, the experimenter thinks that most drugs act through the solar plexus. (Read before the Société de Biologie; *Rev. de Thérap.*, Jan. 1, 1883.)

Strychnine.—Maragliano has used strychnine in dilatation of the heart, with the result of seeing, (1) in one or two days, a reduction of the size of the heart; (2) if the remedy is withdrawn, the heart re-dilates. The daily dose of the sulphate was .002–.003. (*Memorabilien*, Nov. 15, 1882; *N. Y. Med. Record*, Jan. 27, 1883.)

Antidote for Strychnine.—Williams and Waters have discovered an antidote for strychnine in the organic base formed by distilling cinchonine with caustic potash. The name of lutidine was given to it. In frogs it causes a distinct increase in the tonicity of both cardiac and voluntary muscular tissues, and a slowing of the heart's beat. It arrests the inhibitory power of the vagus. It, by acting on the nerve-cells of the spinal cord, first lengthens and then arrests the reflex action of the spinal cord.

An animal is treated with lutidine till reflex action disap-

pears : then strychnine can be given without producing the usual results. In another, strychnine tetanus was produced, when it was found that lutidine caused it to pass off. (*Proceedings of the Royal Society*, xxxi., p. 162; *Dubl. Four. Med. Sci.*, April, 1883.)

Styrone.—Beach¹ obtained a new product by heating styracine (the principle of styrax, or balsam of Peru) with caustic alkalis. He used it as a dressing for ulcerated surfaces, and recognized in it remarkable antiseptic properties.

Popoff has experimented with the substance, and finds :—

1. It is the most powerful antiseptic known, one-fifth per cent preserving urine for three and a half months.

2. Meat will preserve its integrity in an aqueous solution of one per cent, with two per cent of alcohol, for two and a half months.

3. The bacteria of decomposing blood are instantly killed by it.

4. The hypodermic injection of .001 will produce rapidly anæsthesia of the skin of a frog ; a larger dose will cause general convulsions, and then a complete motor paralysis.

5. An intra-venous injection of .05—.08 per kilo. in a dog produces loss of sensibility, followed with larger doses by death. (*Mediz. Obozr.*, February, 1882 ; *Rev. des Sci. Méd.*, April, 1883.)

Sugar as a Dressing for Wounds.²—Lücke of Strasbourg has been experimenting with cane-sugar as an antiseptic dressing. It is used in powder, combined with naphthaline (equal parts) or with iodoform (one part to five of sugar). In open wounds it is applied directly to the surface : in sutured wounds it is put up in gauze, and applied to the part. Several layers of gauze cover the sugar-dressing, over that is a layer of gutta-percha, and the whole is secured by a bandage. This dressing may remain in place from eight to fourteen days : the sugar does not dissolve, and does not form lumps unless the thickness of the layer exceeds one-fifth of an inch. The wounds have a healthy appearance ;

¹ On Styrone, a New Antiseptic : *Boston Med. and Surg. Jour.*, March 11, 1880.

² Abstracted by Dr. C. H. Knight.

the secretions are not offensive, and do not contain bacteria. Cicatrization rapidly progresses, and in sutured wounds primary union has always been observed. These statements are confirmed by H. Windelschmidt of Cologne, who has used sugar alone with good results. In small wounds and ulcers it is not inferior to iodoform; but the latter is necessary in some cases, as chancres and mammary abscess. It is remarked, that powdered sugar is a very old popular remedy in cases of fungous granulations, ichorous eczema, and erysipelas of the face. Windelschmidt has ceased its use, partly because patients, discovering its nature, lost confidence in it, and partly because they treated themselves, and so passed from his observation. He believes, however, that it is a valuable dressing. Its mode of action is not apparent. (*Allgem. med. Central-Zeitung*, Sept. 15, 1883; F. FISCHER in *Centralbl. für Chir.*, No. 34, Aug. 25, 1883.)

Concerning the Use of Preparations of Gold in Syphilis. By M. Martineau.¹

In cases of inveterate syphilis, Martineau prescribes .005-.015 of the chloride of gold three times a day in solution. Under its influence, old ulcers change for the better, and heal. One of his cases, a woman, in an advanced state of syphilitic cachexia, broke her fibula, probably because of a specific change in the bone. Though rebellious to other treatment, she recovered quickly, and the fracture united readily, under the gold treatment.

The Comparative Value of Iodine and Mercury in the Treatment of Syphilis, notably in its Secondary Stage.—Gougenheim² concludes: It is not true that mercury is a specific in the secondary, and iodide of potassium in the tertiary, stage of syphilis; but they are both specifics in all stages of the disease.

Indications and contra-indications for the use of these remedies vary with the age of the patient, with personal idiosyncrasy, and the nature and location of the manifestations to be combated.

¹ *Bull. et Mém. de la Soc. de la Thérap.*, April 30, 1883.

² *Ibid.*, July 15, 1883.

Syzygium Jambolanum.—Mr. Banatvala was led to try this drug (the powdered fruit-stones) in diabetes, by its results in the hands of a native quack. Without any attention to diet, it reduced the specific gravity of one patient's urine from 1.032 to 1.020. Administering it himself, he found it diminished the flow of urine, banished the sugar, and secured immunity from the usual consequences of a starchy diet.

The drug is the stone of a pulpy, bluish-black fruit of a sweetish astringent taste, which is eaten largely by the natives of Western India. (*Midland Medical Miscellany*; *Lond. Med. Record*, Feb. 15, 1883.)

A Case of Tartar-Emetic Poisoning. Recovery after taking One Hundred and Seventy Grains. By James Stratton Carpenter, M.D.

Thomas C——, aged twenty-one, employed in the dispensary department of the Episcopal Hospital, was admitted to the medical ward on the afternoon of June 30, with all the symptoms of acute antimony poisoning. It was learned on inquiry, that, mistaking a bottle of tartar emetic for one containing cream of tartar (the latter having on several previous occasions satisfactorily relieved the constipation to which he was subject), he had poured out several teaspoonfuls of the drug into a tumbler of water, and then drank the solution.

No unpleasant symptoms occurred for a quarter of an hour afterward, when he was taken violently ill, and vomited, as he expressed it, "a wash-basin half-full." This was followed by several more attacks of vomiting, accompanied by a burning sensation, which latter increased to violent pain along the œsophagus, and in the epigastric region. When admitted to the ward, half an hour after taking the poison, he was in a condition of extreme prostration, amounting almost to collapse, with coldness of the extremities, a weak, thready pulse, and the accompanying symptoms of a gastro-enteritis that were distressing to witness. The contents of the stomach having been thrown off, the continued emetic action of the drug but served to add to its depressing effect on the system ;

and after the most violent and oft-repeated efforts at vomiting, which were followed by the ejection of a few drachms of bilious fluid, or of mucus mixed with blood, the patient would sink back thoroughly exhausted.

The full emetic effect of the drug having been obtained, the indications to be met were: First, the administration of the recognized antidote, tannic acid; and second, the proper remedies for a gastro-enteritis accompanied by a most alarming depression of vital energies. Copious draughts of the tannic-acid solution were accordingly given, and these followed by albuminous drinks; the deodorized tincture of opium being given for the burning pain complained of in the abdomen. The thermometer at this time indicated a body temperature of but 35° C.; and the radial pulse, which was scarcely perceptible, was slow and intermittent in character; and it seemed as though the hope were not to be realized, that, in the violent vomiting which had first occurred, enough of the poison had been gotten rid of to prevent a fatal termination.

In addition to internal stimulation, with small and frequently repeated doses of spiritus frumenti and liquor calcis, external stimulation by means of hot-water cans and vigorous friction of the chest, legs, and arms with heated towels was kept up; and it was only after three hours' unremitting care that re-action was established. The temperature rose to 37.5° C., and the pulse improved in rate and force. The patient had a typical "rice-water stool," streaked with blood, and accompanied by rather severe cramps in his legs, several hours after his admission; but this was the only evidence of the intestinal irritation that occurred of that character.

The abdominal pain was largely overcome by the deodorized tincture, of which gtt. cxx. were taken within two hours, in addition to a hypodermic of morphia. The distressing thirst was a difficult feature of the case to meet; but a most grateful drink was obtained by cooling the egg-and-milk mixture with ice, of which he drank frequently in small amounts.

At first the urine was scanty and dark-colored, but contained neither blood nor albumen. The after-treatment was the continuation of the milk-diet, with entire rest in bed for

three or four days, when the patient was discharged cured ; and up to the present time, over two months since the accident, has experienced no further trouble.

The amount taken was not less than ten grams, which I ascertained by afterward asking the patient to pour from a bottle of the tartrate of antimony and potassium the amount he thought he had taken, and then weighing it, — a rather imperfect method of ascertaining the fact ; but, when it is remembered the object the patient had in view in taking the supposed “dose of salts,” the estimate will not appear at all too high.

In this case, it may be interesting to note :—

First, The length of time that occurred between the ingestion of so large an amount of the poison, and the production of its first symptoms, as being in accord with the accepted idea of the action of tartar emetic upon the centres, absorption being first necessary ; rather than its having any direct local irritant action upon the membrane of the stomach, and so causing the violent emesis.

Second, The urine, which, according to some authorities, in the beginning of mild and even of fatal cases, is increased in quantity, was in the present case almost suppressed.

Third, The respirations, which are said to become altered in rhythm by the action of the drug on the respiratory centres, were unaltered in character.

Fourth, There were no disturbances of sensory function ; the ability to appreciate thermic irritants being attested by the patient's ready recognition of the elevated temperature of the hot cans with which his bed was provided. (*N. Y. Med. Record*, Oct. 13, 1883.)

The Present Position of Therapeutics.—A review of therapeutics as a branch of medical science is, we believe, not calculated to gratify the student of medicine, whose ambition is to elevate his subject of study to a level more in harmony with the exact sciences. Physiology, pathology, and every branch of physics bearing on the interpretation of life, as well in sickness as in health, have made wonderful advances within the last fifty years. Surgery also, in

the boldness, variety, and safety of operations, exhibits surprising progress. Can the same be said of therapeutics? This is a question that Rossbach, the new professor of special pathology and therapeutics in the school of Jena, recently undertook to examine in an inaugural discourse. He has, indeed, made it a primary object to establish the advance of internal as compared with that of external therapeutics, as exhibited in the processes and art of surgery; and altogether his mode of dealing with his subject is worthy of notice, and many of his arguments will bear recapitulation.

In demonstrating the progress of internal therapeutics, he gives credit to the Vienna school for the boldness of its assault on the doctrines and practice of therapeutical art, as handed down from preceding generations, and for seeking to found a new therapy based on pathological anatomy and physical diagnosis; for, to build up a rational system of therapeutics, correct notions of the nature and natural history of disease, of its causes and consequences, are essential. Empiricism has been hitherto the unintelligent, unphilosophical guide followed. Thus vaccination has been practised for many years as a preventive of small-pox, based upon observation and experience; but rational therapy demands the interpretation of the way in which it operates, and the nature of the operating agent. And in regard to this matter, not only in the case of vaccination, but also in that of various other diseases, we are encouraged to hope for a solution from the very recent researches respecting the part played by the minutest organisms in the production and propagation of disease; but, besides what acquaintance with the nature of disease may do in our efforts to establish a system of rational therapeutics, we likewise may look to the labors of the pharmacologist for help in investigating the physiological action of medicines, and in determining the principles of dietetics.

Researches respecting the action of remedies have specially contributed to place modern treatment on a more scientific basis. Something is known of most drugs,—what is their physiological action generally, and what their more

special action on particular organs; and we fairly may look for ever-increasing knowledge in this direction, from experiments with remedial agents, rightly interpreted by physiological and pathological science. In fine, we may hope to be able ultimately to comprehend how such agents operate, and to analyze their action in respect of separate organs and tissues.

Further, in practical therapeutics during past times, much inaccuracy has been introduced by reason of the uncertainty of action, and the varying qualities, of the medicinal compounds in use. Usually, both vegetable and mineral substances have been employed in the crude state, and, consequently, modified variously in their operation by accidental circumstances of mixture, or of mode of preparation. In the case of minerals especially, in their crude state, inert and even poisonous materials may exist; as has happened with bismuth, which physicians of past years credited with properties in all probability referable to minute quantities of arsenic it happened to contain. So, likewise, in the case of plants: their medicinal virtues are seriously affected by various accidental conditions affecting the proportion of their active principles. Now, in reference to these circumstances, modern pharmacology has done much towards placing in our hands those active principles, in a state of great purity and of uniformity of strength, and, by so doing, has materially contributed to render treatment more certain.

Again, there are some metallic preparations of unquestionable value—as, for instance, the chlorides of mercury—which, unfortunately, possess not only the valuable properties desired, but in addition exercise an undesirable action. In the case of mercury, the latter is a consequence of its affinity with albuminous matter, so that it arouses inflammatory, and at times even corrosive, action on the mucous membrane of the stomach. In past times this prejudicial action was lessened, as far as it could be, by combining opium with the mercury. Here modern pharmacy has found a more excellent way,—either by forming a double salt of mercury, or by fully saturating the albumen, doing this without prejudice to the beneficial action of the drug.

We can also point to an advance in therapeutics due to the large addition of active drugs, of potency and constancy far surpassing, where their activity resembles, the medicines of our old *Pharmacopœias*, and in many instances exercising effects heretofore unknown in the therapeutical art. Of this fact, it is quite needless to cite illustrations.

Yet, even from the series of therapeutical agents long in repute, modern research has been able to elaborate products and results of unanticipated and additional importance, and, at the same time, to approximately show by what methods, and under what conditions, those results are to be obtained. Illustrations may be quoted in the treatment of fever by cold water, by quinine and salicylic acid; in the treatment of nerve-irritability by bromine and chloroform, of paralyses by electricity, of lung-affections by compressed and by rarefied air, etc. The widening and deepening of therapeutical knowledge is also exemplified by those various novel processes which are affected by specialists, such as hydropathy, gymnastics, massage, etc.

Food and dietetics have been more scientifically studied of late years, so as to materially contribute to our ability to deal with disease.

What may be called negative advances in therapeutics are neither few nor unimportant. Many lessons in what not to do have been acquired; and the valuelessness, nay, even the positive mischief, of many healing processes and agents of a past period, has been demonstrated. Foremost among such uprooted practices is bloodletting, so recklessly and indiscriminately employed in bygone days. Another is the administration of antimony, chargeable in the past with the production of many gastric lesions. And in the same category of discarded proceedings is the abuse of drugs, and, on the other hand, the recognition that many maladies require only proper general management and rest.

In the above sketch of the advancement made in therapeutics, accomplished facts only have been put forward. But the future is rich in promise of still greater advances in our powers of healing, and in an even increasing ratio.

This we are encouraged to assert by noting the resources possessed by the chemist for developing new and powerful remedies. In the direction of antiseptics, and antiseptic and anæsthetic vapors, we are justified in anticipating many novelties, and even in hoping to find antidotes to the poisons of scarlet-fever, diphtheria, small-pox, tuberculosis, and pneumonia, which probably, as also may other diseases, owe their production to morbid germs. Moreover, our expectations for the future of therapeutics are likewise highly encouraged by what the chemist has already accomplished in the production of vegetable principles and bases, and of the series of important compounds derived from the alcoholic group.

Another noteworthy advance in therapeutics is seen in the method of introducing medicinal agents into the system by hypodermic injection. Practically, in former periods, all medicines were given by the mouth, at the cost of much disgust of the organs of taste and smell, and of much nausea, eructations, and stomach trouble. And, apart from such annoyance, many serious defects attended this method: the action of drugs was seriously interfered with by the contents of the stomach, by the digestive process, by imperfect absorption, and by other conditions; and in that, there was derangement of the whole system to attain the wished-for result, even when that result was to be limited to one part or organ. These drawbacks disappear materially by the hypodermic method; and, particularly in connection with topical treatment, there is a remarkable advance, especially in dealing with internal cavities.

We have allowed Rossbach freely to express his own opinions regarding the advance of therapeutical knowledge within the last fifty years. We may fairly say he has taken a flattering review of what has been accomplished in his generation, and that he is sanguine in his hopes for the future. The physiological action of remedies, determined as it has been largely by experiments on the lower animals, has not acquired the scientific accuracy Rossbach pretends. The substitution of vegetable alkaloids for the active principles in plants, as separated by the chemist, cannot be

spoken of as generally advisable. Cinchona, in all its complexity of composition, holds its own as a medicine; and no physician would lay aside opium, though having its multitudinous salts in his possession. And not a few physicians are impressed with the belief that blood-letting has been undeservedly neglected of later times.

Nevertheless, it is of advantage to take an occasional survey of what has been effected, even though we are unable to congratulate ourselves upon the entire results, or to recognize all the changes enumerated as advances to be actual improvements. (*Br. Med. Four.*, July 21, 1883.)

Thymol as an Antipyretic.—Fiori concludes that thymol, in doses of 0.5 to 5., produces rapid and considerable fall of the temperature, and diminution of the frequency of the pulse, in fever. In healthy persons it retards the pulse. With the fall of temperature, there is lowering of arterial tension; there being, withal, no bad effect on the heart. (*Congress Ital. Med. Asso.*, September, 1882; *Lond. Med. Record*, Jan. 15, 1883.)

Injection of Medicines into the Trachea.—Bergeon, knowing that tracheal injections are well borne in animals, has tried them in man. He puts the patient on his back, to guard against syncopal attacks. The experiments of the author are not numerous; but his procedure ought to give good results, because in this way it is possible to reach almost directly the lesion of the respiratory tract, and also because of the rapidity of tracheal absorption. He cites, in closing, a case of phthisis, in which he made twenty-five sedative injections in thirty-five days. (*Assoc. franc. pour l'Avancement des Sciences*, xii.^e session, 1883; *Congrès de Rouen*; *Gazette des Hôpitaux*, Oct. 16, 1883.)

Intra-venous Injection of Saline Solutions.—Szuman reports a successful case of intra-venous injection for anæmia after traumatism and operation. Besides this case, he mentions eight successes, and gives the following as the advantages of this therapeutic measure: 1. One can always

get the requisite fluid. 2. The operation requires no special apparatus, as an injection apparatus and a cannula or probe-trocar are always at hand. Thorough antiseptic precaution must be observed with regard to the instruments. 3. Saline solutions in cases of acute anæmia must supersede transfusion of blood.

Szuman's case was that of a boy, æt. 15, who had sustained a compound fracture of the surgical neck of the right humerus, with laceration of the capsular ligament, and fractures of the right femur and tibia. When seen, the patient was in a state of collapse, the face, lips, and conjunctiva bloodless, and he was almost pulseless. Szuman decided to resect the shoulder-joint, and chloroform was cautiously administered. The wound was dressed antiseptically. The collapse was so great, however, that artificial respiration was employed, the head lowered, and ether injected hypodermatically, with the result of rallying the patient. On the next day the lips were blanched: he was very feeble, and rejected food. Vomiting set in, in forty-eight hours. During a change in the dressing of the wound, convulsive twitchings came on, increased, and the patient became unconscious. As the patient seemed to be dying of cerebral anæmia, ether was again injected, the upper extremity lowered, the limbs rubbed with camphorated spirit, and the uninjured limbs bound with elastic bandages. Intra-venous injection of saline solution was then made: 6. of common salt, and 1. of carbonate of soda, were dissolved in 1 litre of distilled water. A carbolic disinfectant was employed, there being no transfusion apparatus at hand; a small drainage-tube was fixed to a fine trocar; this was inserted into the median vein (into which the cannula was fixed), and the fluid injected until about 250 cc. had been injected, when the patient opened his eyes, the spasms stopped, and he began to talk. After about 750 cc. had entered the circulation, the pulse fell from 144 to 112, and he began to complain of being cold; the injection was accordingly discontinued, and the ligature removed from the vein. From this time, he steadily improved, and finally completely recovered. (*Berlin. klin. Woch.*, No. 21, 1883; *Med. News*, Aug. 18, 1883.)

Intra-venous Injection of an Alkaline Saline Solution after grave Hemorrhages. — Küstner says, that, according to the theory of Golz, death from hemorrhage is less the consequence of the extreme reduction of mass of the blood than from the stagnation in the vessels of the small quantity of blood retained in the organism. When enough blood is retained to satisfy the wants of nutrition and respiration, there still may not be enough to maintain the vascular tonus necessary for circulation. To restore this vascular tonus, he injected an indifferent liquid, which diffused itself through the mass of the blood, like true serum.

Thus Schwarz, in 1881, sought to save the life of some puerperal cases by injecting salt solutions. The same experiments have been repeated, in 1881, by Bischoff; in 1882, by Küstner, Kocher, Kümmel, and Schwarz.

Küstner's case was as follows: A woman of thirty-four was normally confined Aug. 18, 1881, and nursed the child until May, 1882; the menses re-appeared then, but stopped again in September. Jan. 8, 1883, an abundant hemorrhage took place; and Jan. 10, at nine o'clock, a foetus, 30 cm. long, came away, followed by a frightful hemorrhage. The accoucheur removed from the cavity of the uterus a fragment of placenta, which remained adherent; and then the blood stopped.

These hemorrhages left the patient extremely anæmic: there was extreme pallor, syncopal attacks, vomiting; pulse 136, and respirations 36.

Injections of ether slowed the respirations and pulse, and strengthened the patient some. At 1 P.M. the general condition was fair; at 2.30 P.M. the pulse became very small, the respiration rapid, the extremities and nose cold, the eyelids half closed, and consciousness was almost lost.

At this stage the author injected into the right median basilic vein a .5 per cent. solution of common salt at 40° C., with three drops of lye. During the preparation for the operation, which lasted fifteen minutes, the radial pulse ceased, the respiration became very superficial, and complete insensibility supervened.

Almost immediately after the penetration of the liquid

into the veins, the patient breathed more deeply, and complained confusedly of cold. In three minutes the pulse was perceptible and 136. After ten minutes he injected a litre of the solution: the pulse became full and strong, the respiration calm, interrupted only by deep inspirations.

In fifteen minutes the pulse and respiration were regular: the hands, nose, and forehead were warm, but the patient still complained of cold.

At seven in the evening the pulse was 120, respirations 24; there was some color in the face; the tongue, before hard and dry, became red and moist; and the patient asked for food.

On Feb. 3 death took place from acute peritonitis, which was entirely independent of the treatment, and depended on septic infection from the lochia. (*Deut. med. Woch.*, No. 12, 1883; *Arch. Gén. de Méd.*, November, 1883.)

On Feeding by the Veins, and on Intraperitoneal Injection in the Collapse of Cholera. — Richardson, after some remarks on the pathology of cholera, and its treatment by the mouth, says, When feeding by the mouth is impossible, the next indication in the stage of collapse is to feed by the veins. My proposition is to feed in the same way, as nearly as can be imitated, as the venous system is fed in health from the alimentary canal, through the thoracic duct, — slowly and steadily, so as to supply food as well as water.

Up to this time we have been content to inject warm saline solutions into the veins. The results have been often astounding, almost always delusive. In some instances it has seemed as if the injection has restored the dead to life, but the collapse has only too surely recurred.

The reason why certain immediate but not lasting benefits have followed these injections is, that they have been injected after the fluids used have been heated up to, or above, blood-heat; the heat thus supplied has been the underlying basis of the transient success.

The fluid fulfils certain purposes of life for a short time: it supplies warmth; it dilutes the condensed blood; it enables the blood to course more freely through the vessels;

and upon these changes the phenomena of re-animation are presented. With the recovery, however, there is a return of the profuse discharge from the bowels.

Our problem is to find a fluid, which, being gradually and steadily infused, will just keep the animal fire alive while time is given for the alimentary affection, whatever the nature of it may be, to run its course, and cease, — a result which is all but certain, in the majority of cases, when time is obtained.

The objections to blood are too many to permit of its recommendation as a practical method. Could we by some excellent device separate the serum of the blood flowing from the vein of a healthy person, and slowly infuse the serum only, we might expect the best results. Could we add chyle to the serum, the procedure would be theoretically perfect. I found, by the experiment of mixing milk with blood, that the milk does not hold the blood-corpuscles in good suspension. I also found, that when fresh defibrinated blood, warmed to 38°, was mixed with fresh milk at the same temperature, there was very quick coagulation of the caseine, so that the combined fluids did not flow readily through the injecting needle.

In 1866 I found that the fluid which would best take up and distribute the corpuscles of blood, which had been condensed by the slow evaporation of one-third of its water, was composed as follows :—

White of egg	.	.	.	.	.	.	.	.	.	120.
Common salt	.	.	.	.	.	.	.	.	.	4.
Phosphate of soda	.	.	.	.	.	.	.	.	.	2.
Clarified animal fat	.	.	.	.	.	.	.	.	.	30.
Pure glycerine	.	.	.	.	.	.	.	.	.	60 cc.
Water q. s. ad.	.	.	.	.	.	.	.	.	.	500 cc.

In preparing, dissolve the common salt and phosphate of soda in the water, and, having well whipped the albumen, add that also to the water. Place the mixture on a water-bath, and raise the temperature to 57.5°; keep the mixture steadily stirred, and digest at this temperature for one hour. This constitutes an artificial serum, the albumen of which hydrates freely. Having taken the artificial serum off the bath, place the fat and the glycerine together in a crucible,

and melt the fat in the glycerine. When the process of solution of the fat is complete, pour the solution into the artificial serum at 49°, and stir in carefully; set aside, that the fluid may cool to 27°, at which point all the fat that is insoluble at 27° will float on the surface. Take this off, and filter carefully. The fluid thus obtained is of pinkish color, of saline, sweetish taste, and of sp. gr. 1.038. It picks up fluid blood with instant readiness, and diffuses it most equally. Heated, it takes up one-third more caloric than water in the same time; and in cooling it restores nearly one-third more.

120–180 cc. should be injected at a time, and the process repeated.

On Aug. 22, 1854, I submitted to the East Surrey Medical Society a suggestion for the treatment of cholera during collapse by the production of artificial peritoneal or cellular dropsy; and cases of cholera, among them some of mine, recovered from the stage of collapse after the free injection of warm water into the peritoneal cavity.

While recording these facts as to peritoneal injection, I am of the opinion that the plan of feeding by the veins is the sounder practice. (*Med. Times and Gazette*, Aug. 4, 11, and 18, 1883.)

Peritoneal Transfusion.—Howe experimented on the lower animals to test the absorptive power of the peritoneum, and to determine the harmlessness of intra-peritoneal injections.

He concludes, that the peritoneum will absorb blood; that the operation is liable to excite a limited amount of peritoneal inflammation; and, if the blood of another species is used, there is a likelihood of establishing general peritonitis. A good result can rarely result from the injection of milk; while, in the human adult, alarming symptoms were invariably produced by it. Plain water seemed to cause more irritation than any other liquid used.

On the whole, Howe thinks the operation dangerous and useless, as compared with gastric or rectal alimentation or stimulation in chronic cases, and with intra-venous trans-

fusion in emergency cases. (*Experiments in Peritoneal Transfusion*, *N. Y. Med. Record*, Feb. 3, 1883.)

Peritoneal Transfusion from an Artery.—Corona and Cocco-Pisani, after making experiments on animals as to the effects of direct transfusion from an artery into the peritoneal cavity, report the following results: 1. Pure blood, passed directly from a carotid artery into the perineum of another animal, is entirely absorbed. 2. In small animals, three ounces of blood had been entirely absorbed in five days. 3. The blood, until its disappearance, remains fluid in the peritoneal cavity. 4. The increase of hæmoglobine begins after twenty-four hours, and continues for a certain indefinite time. 5. The animal suffers no injury on the part of the peritoneum or of any other organ. (*Centralbl. für Chir.*, March 24, 1883; *Med. News*, June 9, 1883.)

Hypodermic Injection of Blood.—Paladini transfused successfully by injecting 130. of blood into the abdominal cellular tissue.

His subject was a case of metrorrhagia. The injections caused no pain. In two hours, the bloody swelling had disappeared. No abscess or induration, and a slight ecchymosis only, remained. The next day, the hemorrhage had ceased; the patient had taken some nourishment, and slept tranquilly.

He thinks, by making the injections in two or three different places, 300.-400. of blood can be given, and gives this process the precedence over intra-venous or intra-peritoneal injection. (*Gazetta Med.*, Aug. 25, 1883; *Bull. Gén. de Thérap.*, Sept. 30, 1883.)

Peritoneal Transfusion in Pernicious Anæmia.—Ponfick first published (*Berl. klin. Woch.*, September, 1879) the results of three cases of pernicious anæmia in which peritoneal transfusion of blood had proved of some value. Bizzozero and Golgi afterwards showed that the patient's blood was enriched in hæmoglobine by the transfusion.

Foà and Pellacapi traced the path of the colored corpuscles into the blood-vessels by way of the lymphatics of the abdominal glands and diaphragm.

A collection of cases made by Professor Burresi shows thirty-eight published instances of the operation, of which twenty-seven were made in Italy. There were seven in which it did distinct harm, twenty-four in which it was judged to have done more or less good, and seven in which it did neither good nor harm.

Turpentine in Secondary Syphilis and in Phagedænic Sores following Fever.—Nicholson narrates two cases of syphilis, which had apparently been cured by iodide of potassium, and rest, but which both came back to the hospital with syphilitic plaques and induration of the skin, and subcutaneous tissue above and below Poupart's ligament.

They were given 4. doses of turpentine in an emulsion liquor potassæ and 60. of water, twice a day. The sores, meanwhile, were treated by compression of leaden plates and bandages. Both cases were cured.

Later the writer treated a third specific ulcer, and also a syphilitic orchitis, with turpentine, with equally good results.

In West Australia, the writer saw cases of an endemic continued fever, apt to be followed by prolonged ill-health. In one of these cases, slowly progressing, phagedænic and ashy-colored sores formed in the thigh. Erosion took place, in one instance, to the exposure of the femur. Ordinary local treatment failed, but turpentine in 12 doses finally healed both. (*Med. Times and Gaz.*, Sept. 1, 1883.)

The Anti-parasitic Treatment of Tuberculosis: Anti-septic Surgery of the Lung.¹ A review by Ricklin.

We have already mentioned the clinical experiments tried with a view to check the march of pulmonary tuberculosis by parasiticide medicine, — experiments inspired by Koch's recent discoveries, and performed chiefly at the principal hospital of Berlin.

We have stated that these experiments were risky, if not reprehensible; for they consist partly of the inhalation of irritant and toxic vapors, and sometimes of the injection, directly into the lung, of irritant liquids such as alcohol, solutions of corrosive sublimate, or nitric acid. With a frank-

¹ An editorial in the *Gaz. Méd. de Paris*, Sept. 22, 1883.

ness which does them honor, and to which we have done justice, they confess that the results obtained have been deplorable.

Hiller's experiments were made on ninety-one cases of tuberculosis in the wards of Leyden in Berlin. The cases were those which still held out some hopes of recovery.

There were employed, (1) corrosive sublimate, (2) iodoform, (3) bromine, (4) ethylic alcohol, (5) methylic alcohol, (6) sulphuretted hydrogen, (7) arsenious acid, (8) boric acid, (9) salicylic acid.

These remedies were given as inhalations in the form of gas or vapor or a medicated spray, by parenchymatous and subcutaneous injections, and by the mouth.

Whatever the drug used, and whatever way administered, the tubercular process was not checked, nor did the bacilli disappear from the sputa.

Treatment by corrosive sublimate gave the best results; but the patients thus treated were benefited by nutritious food, cod-liver oil, brandy, and acid phosphate of lime. In every case the medicine was administered hypodermically in daily doses of .001-.0015.

Forty-four cases were thus treated; and, with more than half, the treatment had to be given up, either because the patient dreaded the pain caused by the injection, or because the medication caused accidents to be spoken of later.

Of nineteen patients where the treatment could be fully carried out,—i.e., forty injections in the course of forty-five days,—five died in a few weeks. The other twelve showed an improvement, which Hiller called apparent only, but which allowed them to leave the hospital. He treated chiefly tuberculous patients with lesions of the apices. The general condition, satisfactory to start with, was maintained, and in some cases improved. The stethoscopic signs improved, and the expectoration diminished. The tubercular bacilli became less numerous in the sputum.

In some cases, injections of sublimate are badly borne, causing stomatitis, salivation, indigestion, a bad taste in the mouth, diarrhoea, tremors, insomnia, prostration, etc.

In advanced cases, bedridden and feverish patients, subli-

mate is deleterious, produces prostration, and hastens the fatal termination.

In two cases of tuberculous laryngitis, with very slight implication of the lungs, Hiller used inhalations of an atomized sublimate solution, with no good result.

In three other cases, he practised injections of sublimate into the pulmonary parenchyma. With a syringe he injected each day 2 cc. of a one-tenth-per-cent solution through an intercostal space. Sublimate is exceedingly irritating to the lung; and the inevitable contact of the medicated solution with the bronchial mucous membrane sets up violent fits of coughing, followed in one case by serious hemoptysis.

Albrecht¹ submitted his patients to methodical inhalations of pure oxygen, without changing their usual diet; and he claims to have checked the progress of the disease: the patients stop losing weight, and perhaps even gain; and Koch's bacilli become less numerous in the sputum. Guinea-pigs inoculated with tubercle were submitted to inhalations of oxygen as soon as the disease appeared developed. Those having oxygen lived six months; those not having it, four months.

In 1873 Mosler (*Berlin. klin. Woch.*) opened a superficial cavity in the lung, in order to use antiseptic injections.

Fenger and Hollister in 1881 (*Am. Jour. Med. Sci.*) have treated six cases, having cavities following acute affections, by incision and free drainage. One case recovered.

Later (*Lond. Med. Record*, Jan. 15, 1882), they had a case with a cavity following gangrene situated in the middle lobe, which recovered after incision and drainage.

Bull (*Nordisk. Med. Archiv.*, t. xiii. No. 17) reports recovery in a case of gangrenous cavity of the left apex, incised and drained.

In another case (*idem*, t. xiv., No. 26), an encysted pneumothorax was taken for a cavity, and operated on with a fatal result.

Sokolowski (*Gaz. Med.*, 1882, No. 52) made unsuccessful attempts to cause absorption of the putrid secretion by means of carbolyzed and iodized solutions.

¹ *Deut. med. Woch.*, No. 29, 1883.

Koch has repeated this attempt upon two subjects affected with putrid bronchitis, with bronchiectasis; but he resected a rib by means of the galvano-cautery. One of the patients died.

Seiffert¹ injected into the lung at the supposed site of the bronchial dilatation, by means of a syringe and long cannula, 2 cc. of a three-per-cent solution of carbolic acid at each sitting. It seemed to diminish the expectoration in one case: the other died.

Bacchini² operated, by incision, on a woman of twenty-seven, who, after a pneumonia, showed signs of an abscess of the right lung. An exploratory puncture confirmed this diagnosis: a little later, the abscess opened into the bronchi, and the patient expectorated immense quantities of pus.

He then made a free incision in the second intercostal space, which put a stop to the purulent expectoration. On the eighteenth day the patient coughed up gangrenous pieces of lung-tissue. The recovery was not complete when the case was published.

Creosote in Tuberculous Affections. — Marly, after laying down some hygienic and general therapeutic rules, speaks very highly of the use of creosote.

He says, that, at the outset of phthisis, it calms the cough, and diminishes expectoration. The lungs clear up; the digestive troubles disappear, as do the night-sweats. The courses are re-established in women, the fever subsides, the patients gain weight. (*Rev. de Thérap.*, Jan. 1, 1883.)

Corrosive Sublimate and Sulphur, in the Treatment of Phthisis. — Ananiin gave .01 of corrosive sublimate hypodermically daily to phthisical patients, with entirely negative results.

Given by a steam pulverizator, there was only a slight improvement in expectoration and dyspnoea.

On the other hand, inhalations of sulphurous acid (1) lessen fever and night-sweats, (2) lessen expectoration, and change its properties (the sputa becoming mucous), (3) less-

¹ *Berlin. klin. Woch.*, 1883, No. 24.

² *Imparsiale*, 1883, No. 11.

en dyspnœa, and (4) improve the general nutrition, and strengthen the patients (by checking fever and night-sweats).

The patients were made to breathe deeply once or twice daily, for ten to twenty minutes, in a room in which from 30. to 100. of sulphur to 77 cubic metres of air were burnt: at the same time there were daily made sulphur fumigations of the wards, beds, clothing, etc. (*Mediz. obozr.*, June, 1883; *Lond. Med. Record*, Dec. 15, 1883.)

Tentative Therapeutics of Tuberculosis inspired by the Discovery of the Microbe.—Lannois, at the end of a general review of the subject of tubercular bacilli, sums up the present results of anti-parasitic treatment.

Buchner¹ believes it impossible to act directly on the bacilli, and has faith only in those medicines which heighten the resistance of the system, and especially arsenic (because of its good effect in malaria). The results of this treatment of phthisis appear favorable to him.

Kempner² and Lindner³ both think arsenic improves the general condition, but not the local trouble.

Stintzing⁴ appears to have had poorer results.

Fraentzel, with Koch and Goffky, guided by Koch's researches, has chosen to use those remedies which can be inhaled; the inhalation, by means of special apparatus, being continued for eleven or twelve hours. The medicaments used have been spirits of peppermint, camphor, naphthaline, creosote, carbolic acid, and analine (under the use of the latter, one patient became anæmic, and died).

He had no good results from the use of carbolic acid, which prevents the culture of the bacilli; nor was creosote successful, while, by the mouth, it is known to be useful. Fraentzel concluded that medicine inhaled did not come in direct contact with the germs.⁵

Albrecht⁶ has had good results in the inhalation of pure

¹ *Ätiolog. Therapie und Prophylaxis der Lungentuberculose*, München und Leipzig, 1883; et *Centralblatt für klin. Med.*, 1883, No. 25.

² *Berlin. klin. Woch.*, No. 31, July 30, 1883.

³ *Deut. med. Woch.*, Aug. 22, 1883.

⁴ *Centralbl. für klin. Med.*, No. 32, 1883.

⁵ *Verhandl. des II. Cong. zur Wiesbaden*, 1883.

⁶ *Deut. med. Woch.*, No. 29, 1883.

oxygen by tubercular patients, and finds that guinea-pigs live longer, when inoculated with tubercular matter, if given inhalations of oxygen.

Hiller¹ (see p. 242).

Recently Pick² has recommended aluminium, thinking that that metal had a poisonous effect on bacilli. He gives the powdered metal, in pills, in doses of .10 a day.

Lannois himself of late has used the iodide of potassium, in doses varying from 2–6. a day, and in some febrile cases has found the drug useful. (*Consult.* PARROT *et* MARTIN, *Rev. de Méd.*, Oct. 10, 1883; DEBOVE, *Prog. Méd.*, 1883; FRAENTZEL, *Deut. milit. Zeitschr.*, Heft 8, 1883; HEITLER, *Wien. med. Woch.*, Nos. 43, 44, 1883; *Rev. de Méd.*, Nov. 10, 1883.)

Treatment of Phthisis. — Kazansky insists on the importance of the antiseptic treatment of consumption. He advises impregnating the air with the vapor of turpentine and benzine, by placing dishes of a mixture (4–1), or by sprinkling it on the floor. The oil of eucalyptus in alcohol (1–10) is valuable, but less effective. He praises inunctions of sulphur over the affected side of the chest as a remedy for night-sweats, and as an expectorant. He deplores the use of opium, and employs hysoscyamus and chloral as anodynes. (*Vracheb. Vedomosty*, 1882, Nos. 531, 533; *Lond. Med. Record*, June 15, 1883.)

Veratrine. — Pécholier and Redier, after experimenting on frogs, rabbits, and dogs, sum up their conclusions as follows:—

1. Veratrine is a local irritant to the skin, mucous membrane, and denuded cutis.
2. It causes copious vomiting and stools; also
3. An increase in the flow of nasal mucus, saliva, and urine, and rarely of perspiration.
4. The heart is accelerated primarily during the vomiting, and secondarily slowed during collapse.
5. There is first accelerated, and then slow, difficult, and embarrassed, respiration.

¹ *Verhandl. des II. Cong. sur Wiesbaden*, 1883.

² *Wien. med. Woch.*, No. 19, 1883.

6. A lowering of the temperature occurs.

7. Primary excitation of the muscles, longer or shorter, according to the size of the dose; apparent contractures; secondary weakening, and final paralysis and collapse occur. Its action is antagonistic to that of strychnine.

8. It acts directly on the muscular fibre.

The symptoms of irritation due to the local action of the drug are soon followed by anæsthesia and analgesia. Intelligence is preserved. (*Académie des Sciences; Gaz. Méd. de Paris*, May 5, 1883.)

Treatment of Vulvo-Vaginitis in Young Girls. — Chéron advises, as general treatment, daily baths containing 1 kilo. of table-salt, and 120. of starch. Before each meal, tr. iodine .03, bromide of potash .10, in 4 cc. of sirup of tolu.

To drink with each meal a solution of carbonate of soda with wine, and to use mild laxatives.

Local treatment consists of injections, morning and night, of laudanum .07, alum .10, neutral glycerine 4 cc., in half a glass of tepid water. Leave between the labia a small pledget of lint, saturated with the solution. (*Rev. Med.-Chir. des Maladies des Femmes; Prog. Méd.*, Jan. 6, 1883.)

The Effect of Abundant Water on Fever. — Wilischanin made animals feverish by the injection of putrid decomposing blood, and then fed them large quantities of warm water, and noted their weight and bodily temperature.

He found the temperature fell. The deprivation of water in the later stages of the fever also lowered the temperature. The animals became dull and sleepy. The appetite increased. When deprived of water, the animals lost weight; and there was found a granular degeneration of the kidneys, liver, and heart, that of the liver being found most frequently. (*Centralbl. für die med. Wiss.*, Sept. 22, 1883; *Lond. Med. Record*, Dec. 15, 1883.)

Oil of Wintergreen. — Flint reported thirteen cases of acute articular rheumatism treated by oil of wintergreen, his results confirming those reported by Kinnicutt some months before. Of thirteen cases, one died with pneumonia

after the rheumatism was cured. The longest duration of the disease was fifteen days, and the shortest, two days. The average length of time was a fraction less than five days. (*Proceed. N. Y. Med. and Surg. Soc.*, Jan. 27, 1883; *N. Y. Med. Jour.*, June 30, 1883.)

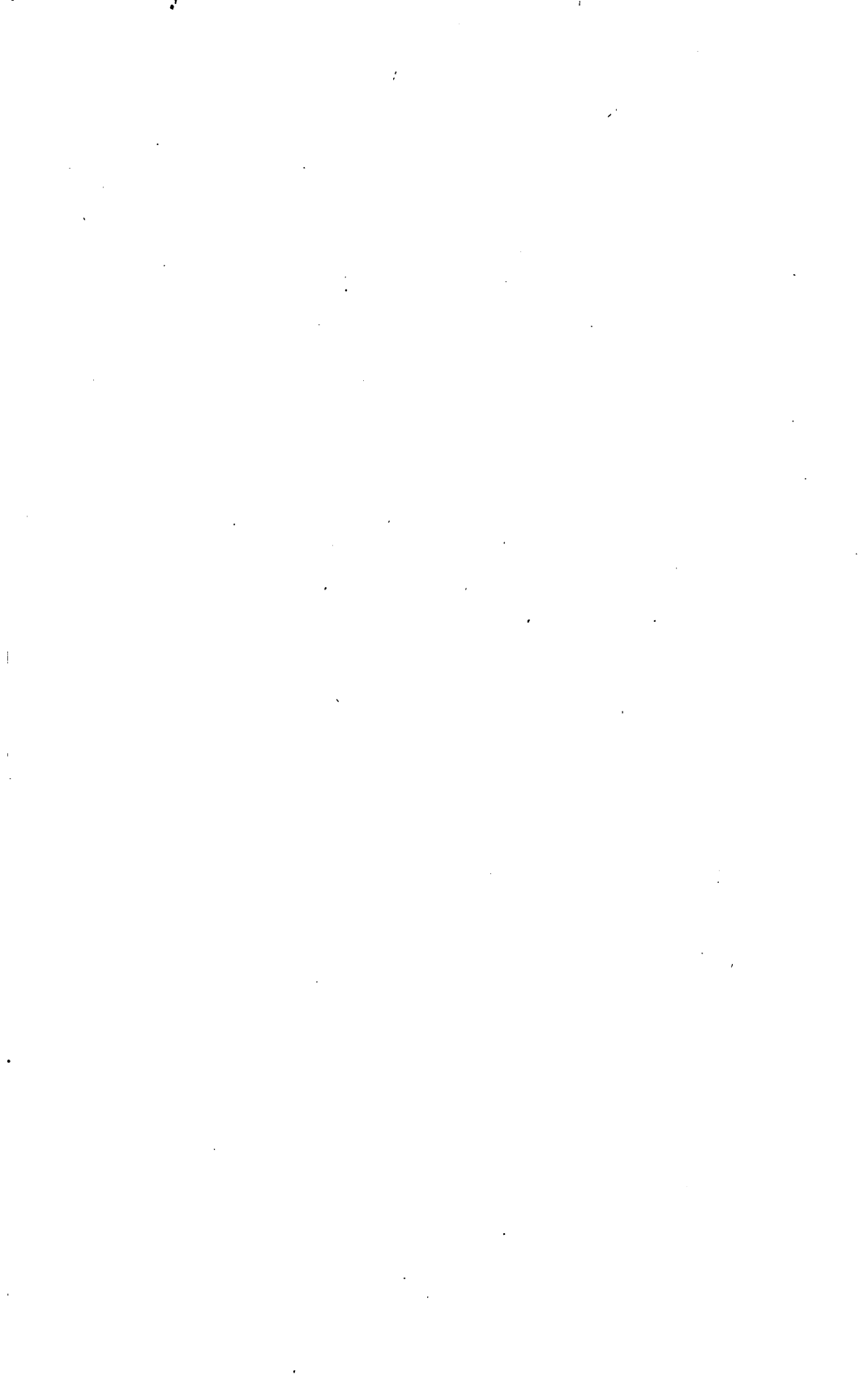
Disinfectant Treatment of Yellow Fever. — Sabucedo considers it proven beyond doubt that yellow-fever is contagious, knowing of the recent claims of Carmona and Freire to have found the organisms which produce the fever. His treatment commences by an emetic dose of ipecacuanha or of oil of almonds with lemon-juice; afterwards a purgative dose of citrate of magnesia. On alternate hours he gives .60 of salicylate of soda, and .16 of carbolate of soda. Free sweating generally appeared immediately, with a fall of temperature, which gave great relief to the patient.

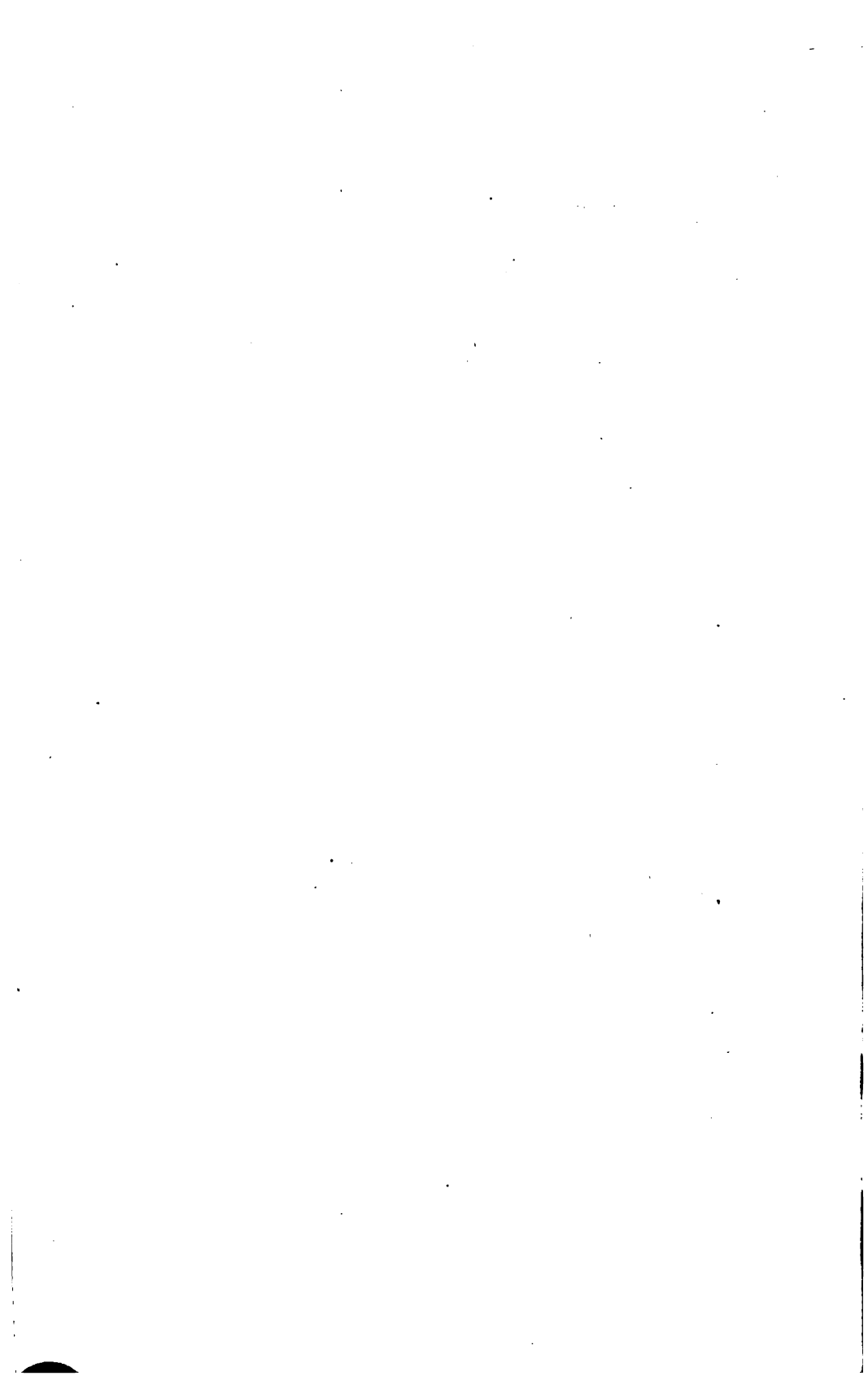
In favorable cases, the fever terminated in the afternoon of the third day, or in the morning of the fourth day. In grave cases the temperature rose again, but did not reach the original level. Albumen appeared in the urine, which, however, continued abundant. Of the 164 cases, 91 terminated favorably, with the symptoms of the first stage only, and without the appearance of albumen, and made a good convalescence. Seventy-three cases passed on to the second stage, and of these nine died. In former years, 30–50 per cent died in the same hospital. (*Revista de Medicina y Cirugia Practica*, July, 1883; *Lond. Med. Record*, Nov. 15, 1883.)

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